

SDMS US EPA REGION V

COLOR - RESOLUTION - 3

IMAGERY INSERT FORM

Multiple pages of this document include color or resolution variations and may be illegible in SDMS due to bad source documents. Unless otherwise noted, these pages are available in monochrome. (The source document page(s) are more legible than the images.) The original document is available for viewing at the Superfund Records Center.

SITE NAME	SAUGET AREA I
DOC ID #	150759
DOCUMENT VARIATION	___ COLOR OR <u>X</u> RESOLUTION
PRP	RMD - SAUGET AREA 1
PHASE	ERR
OPERABLE UNITS	
PHASE (AR DOCUMENTS ONLY)	___ Remedial ___ Removal ___ Deletion Docket ___ ___ Original ___ Update # ___ Volume ___ of ___
COMMENT(S) MAPS & TABLES	

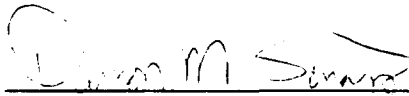
#150-7,1

**PRELIMINARY ECOLOGICAL RISK ASSESSMENT
FOR
SAUGET AREA 1, CREEK SEGMENT F
SAUGET, ST. CLAIR COUNTY, ILLINOIS
TDD: S05-9703-012
PAN: 7M1201SI**

August 31, 1997

Prepared for:

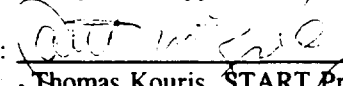
**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Emergency and Enforcement Response Branch
77 West Jackson Boulevard
Chicago, Illinois, 60604**

Prepared by: 
Damon Sinars, START Project Manager

Date: 8/29/97

Reviewed by: 
Mary Jane Ripp, Assistant START Program Manager

Date: 5/23/97

Approved by: 
Thomas Kouris, START Program Manager

Date: 3/29/97



ecology and environment, inc.

International Specialists in the Environment

33 North Dearborn Street, Chicago, Illinois 60602
Tel. 312/578-9243, Fax: 312/578-9345

recycled paper

Table of Contents

<u>Section</u>	<u>Page</u>
1 Introduction	1-1
2 Problem Formulation	2-1
2.1 Environmental Setting	2-1
2.1.1 Site Description	2-1
2.1.2 Site Assessment	2-2
2.1.3 Sensitive Habitats	2-2
2.1.4 Endangered Species	2-2
2.2 Chemicals of Concern	2-3
2.2.1 Sampling Methods	2-3
2.2.2 Chemicals at the Site	2-3
2.2.3 Assumptions and Uncertainty	2-4
2.2.4 Fate, Transport, and Ecotoxicity	2-5
2.2.5 Interaction	2-7
3 Conclusions and Recommendations	3-1
4 References	4-1
 <u>Appendix</u>	 <u>Page</u>
A Photodocumentation	A-1
B Species List	B-1
C Analytical Results	C-1

List of Figures

<u>Figure</u>	<u>Page</u>
2-1 Site Location Map	2-8
2-2 Site Features Map	2-9
2-3 Sample Location Map	2-10

List of Tables

<u>Table</u>	<u>Page</u>
2-1 Comparison of Site Sediment Data with Nonregulatory Sediment Quality Criteria	2-11
2-2 Comparison of Site Sediment Dioxin Data with Nonregulatory Ecological Risk Criteria . . .	2-12

1. Introduction

The Ecology and Environment, Inc. (E & E), Superfund Technical Assessment and Response Team (START) was tasked by the United States Environmental Protection Agency (U.S. EPA) to prepare a screening-level ecological assessment for the Sauget Area 1, Creek Segment F site (the site) under the Superfund Removal Program Technical Direction Document S05-9703-012.

The following report summarizes preliminary findings regarding potential ecological risk at the site. This screening-level ecological assessment is based on information gathered during a site visit on April 18, 1997. The objective of this report is to determine whether the site poses no immediate or long-term ecological risk, or if a potential ecological risk exists and further evaluation is necessary.

2. Problem Formulation

2.1 Environmental Setting

2.1.1 Site Description

The site is a periodically flooded wetland, approximately 1 mile long. It is located in west-central St. Clair County, Illinois, directly across the Mississippi River from St. Louis, Missouri (Figure 2-1). The site is a drainage area for Dead Creek, which is an intermittent stream flowing south-southwest. Contaminated runoff that flows into Dead Creek may be deposited into the site. In order to isolate severe contamination, Dead Creek was blocked at Judith Lane, approximately 2 miles upstream from the site. Currently, a culvert exists at Judith Lane to allow flow during high water events. The creek then flows through the town of Cahokia, through a series of culverts, and enters the site area. Surface water leaves the site by outletting into the Prairie du Pont Floodway, then into the Cahokia Chute of the Mississippi River. The site is located immediately east of a United States Army Corps of Engineers flood control levee. The width of the flowing water on site varies with the season. The current assessment was conducted in April, during a relatively wet time of the year.

The land use surrounding the site and Dead Creek is a mix of industrial, agricultural, residential, and commercial. The nearby industrial areas consist of former municipal and industrial waste landfills, and excavation pits containing unknown industrial wastes. Several sites in the area have been investigated and cleaned by the Illinois Environmental Protection Agency (IEPA), U.S. EPA, and various consultants for the agencies or area industries. Railroad tracks exist to the east and to the west of site. Access to the northern portion of the site is unrestricted. Access to the southern portion of site is restricted by a fence to keep vehicles out, but not pedestrians. Some random dumping of household-type waste is evident in the area.

2.1.2 Site Assessment

On April 18, 1997, START members Damon Sinars and Donovan Robin conducted a site investigation with U.S. EPA On-Scene Coordinator (OSC) Samuel Borries, U.S. EPA Remedial Project Manager (RPM) Leah Evison, U.S. EPA Ecologist James Chapman, and IEPA Project Manager Paul Takacs.

2.1.3 Sensitive Habitats

During the assessment, U.S. EPA Ecologist Chapman investigated the habitat quality found on the site. Some of the findings are summarized below. Site features are shown in Figure 2-2 and photodocumentation is presented in Appendix A.

The site acts as a wooded corridor for Dead Creek. The corridor ranges in width from approximately 20 to 100 feet, and has a predominantly cottonwood overstory. The variation in corridor width may be partially attributed to upstream flooding due to beaver dams. The trees form a mostly closed canopy over the upstream portion of the site, but Dead Creek broadens downstream so that the canopy only covers the bank. The vegetation is of low floristic quality, consisting primarily of invasive and pioneer plants. This is consistent with the fact that the wetlands were drained and the woods were cleared prior to the 1930s, and the surrounding land is highly disturbed by agriculture and industry. However, the site does provide good quality wildlife habitat, as evidenced by its use by the Black-Crowned Night Heron, a state-listed endangered species. Also, there are plentiful detrital inputs (twigs, bark, and leaf litter) to the creek, which provides a substantial food base to benthic invertebrate populations. One limitation to the benthic invertebrate population is the lack of riffle areas and therefore, a potential for periods of low dissolved oxygen levels. A list of species identified on site is presented in Appendix B.

2.1.4 Endangered Species

One federally-listed threatened species is recorded in St. Clair County, the Decurrent False Aster, *Boltonia decurrens*. The preferred habitat of the plant is alluvial prairie and marshland in river floodplains (Herkert 1991). It is unlikely to occur on the site due to the history of extensive disturbance. Since the species flowers in September and October, the present survey provided no evidence regarding its potential occurrence at the site.

Several state-listed birds are likely to utilize the site. Only the Black-Crowned Night Heron was seen on site:

Black-Crowned Night Heron, *Nycticorax nycticorax* (endangered)
Little Blue Heron, *Florida* (= *Egretta caerulea*) (endangered)
Snowy Egret, *Egretta thula* (endangered)
Great Egret, *Casmerodius albus* (threatened)
Pied-Billed Grebe, *Podilymbus podiceps* (threatened)

2.2 Chemicals of Concern

2.2.1 Sampling Methods

During the site investigation, nine sediment samples (F101 through F109) (including one duplicate [F109] and one background [F107] sample) were collected at various locations in the wetland (Figure 2-3). Samples were two- or three-point composites obtained using either a corer or shovel, depending on sediment consistency and water depth. The first composite point at each sampling location was collected at the deepest portion of the channel, on the east side of the surface water body. The east side of the surface water body appeared to be more permanent than the central and west sides. The sediment was scooped out and placed into a stainless steel bowl. The second composite point was collected in the central or west portion of the surface water in an area where contaminants may have been deposited. It was placed in the same bowl and the sample was thoroughly mixed and placed into a sample jar. Sampling equipment/tools were decontaminated following each use. The samples were sent to EIS Analytical Services in South Bend, Indiana, for metal, polychlorinated biphenyl (PCB), polyaromatic hydrocarbon (PAH), pesticide, total organic carbon (TOC), and dioxin analyses under analytical TDD S05-9704-806.

2.2.2 Chemicals at the Site

Due to resource limitations, not every parameter was analyzed for every sample. In addition, only detected contaminants are reported in the tables. Analytical results are presented in Appendix C.

Since the primary goal of this assessment was to screen for human and ecological risk, the maximum detection level for each contaminant was used. These maximums were compared with benchmark criteria, including human health risk-based values for industrial soils (U.S. EPA 1993b) and the Ontario Provincial Sediment Quality Guidelines (Persaud, et al. 1993). Table 2-1 lists the

maximum detection levels for the detected contaminants with the Sediment Quality Criteria (SQC) and a Hazard Quotient (HQ). SQC defines a Lowest Effect Level (LEL) and a Severe Effect Level (SEL) for individual contaminants, where enough information is available. LEL refers to marginally polluted sediments in which ecotoxic effects become apparent, but the majority of sediment-dwelling organisms are not affected. SEL refers to heavily polluted sediments likely to affect the health of sediment-dwelling organisms. HQ is a value equal to dose divided by guideline level. The HQ assists in identifying contaminants where severe risk potentially exists.

Results indicate that human health is not severely at risk. The maximum detections for all of the contaminants are below the human health risk-based values. When compared to ecological criteria, the data suggest contamination is a problem.

The metals data indicate that severe contamination exists from arsenic and cadmium (SEL HQs greater than 1) and minor pollution from chromium, lead, and mercury. All nine samples exceeded the SEL for arsenic (144 to 276 parts per million [ppm]), including the background which had the lowest level (144 ppm). Three samples exceeded the LEL for cadmium, one of which exceeded the SEL. The other samples, including the background, were "non detect" for cadmium. Three samples contained PCB Aroclor-1254, all of which were between the LEL and SEL. Only one sample (F105) contained PAHs. The four PAHs detected were similar to the LEL, but far below the SEL. The maximum concentration of dioxin detected exceeded the high risk concentration for both birds and mammals (Table 2-2). In addition, pesticides were not detected above background in any sample.

Sample F104 contained the highest metal concentrations; sample F102 contained the highest PCB and dioxin concentration; and sample F105 was the only sample to contain PAHs. The background sample (F107) contained the lowest concentration of each contaminant, except barium. The duplicate samples, F108 and F109, showed very similar results.

2.2.3 Assumptions and Uncertainty

This assessment is performed with the following conservative assumptions:

- 1) The Area Use Factor is 100%: the organism spends all of its time in the contaminated area, so is constantly exposed;

- 2) Bioavailability is 100%: Conditions do not limit the uptake or absorption of the contaminant;
- 3) The most sensitive life stage is present (e.g., early stage); and
- 4) Species feed entirely on the most contaminated dietary option.

Because this is a screening-level ecological risk assessment, uncertainty is intentionally assumed to be the worst-case scenario in order to not miss contamination that might be present.

2.2.4 Fate, Transport, and Ecotoxicity

A description of the sources, endpoints, and effects of the ecologically important contaminants found on site follows:

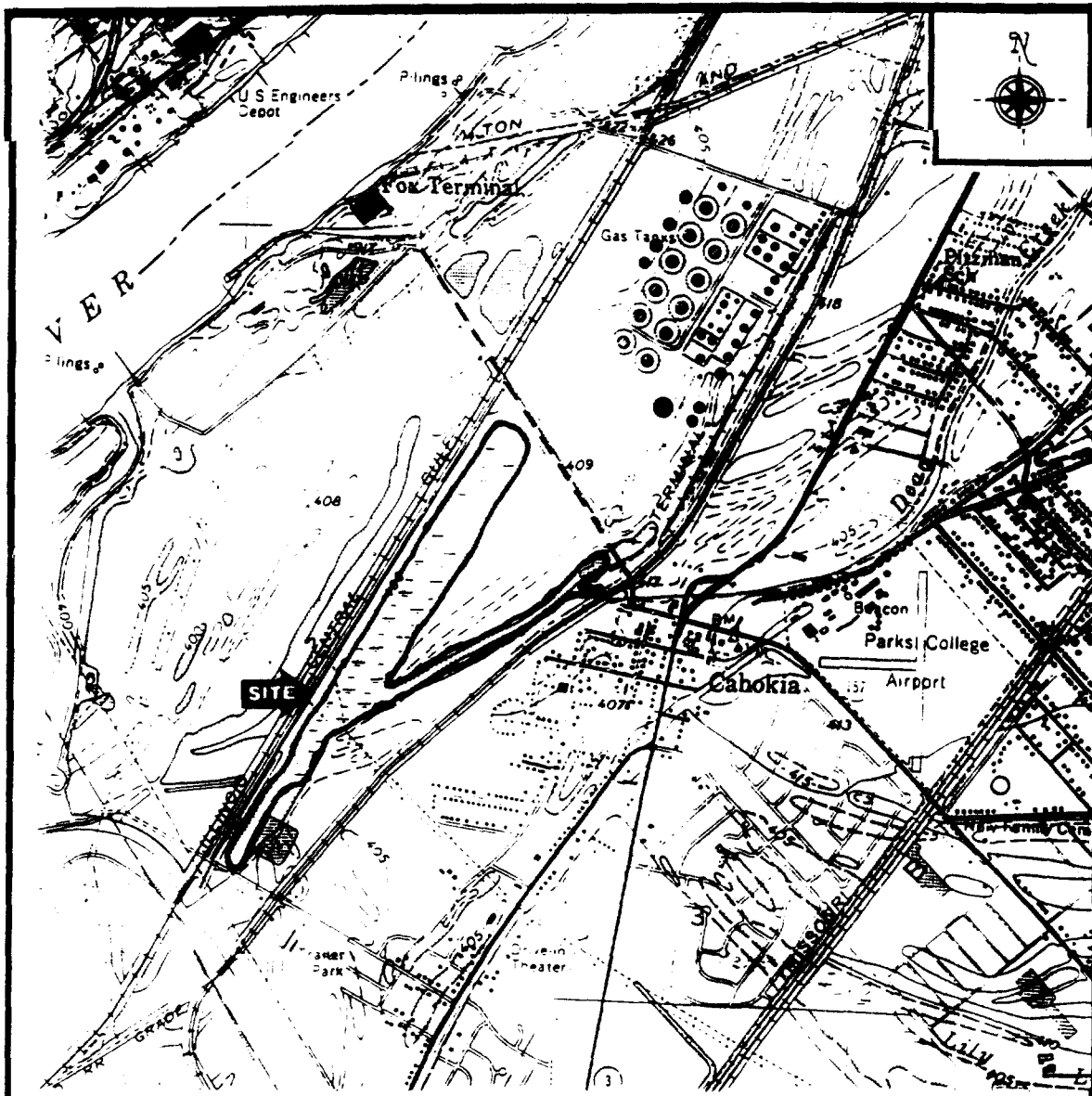
- **Arsenic.** Arsenic (As) is used in alloys, glass, wood preservatives, and pesticides. Pesticides were produced near the site. As an elemental metal, arsenic is highly persistent in air, water, soil, sediment, and all living tissues. Along with the possibility of being transported by runoff flowing into the stream and subsequently into the wetland, arsenic may be transported via atmospheric fallout (U.S. EPA 1978). Arsenic has been shown to strongly bioaccumulate in fish tissues and in freshwater molluscs. Arsenic appears to have relatively moderate aquatic and mammalian toxicity. A major concern with arsenic compounds is their strong mutagenic and carcinogenic potential (Ontario Ministry of the Environment [OMOE] 1992). Acute toxicity, as well as sublethal effects, have been observed in fish and invertebrates (National Oceanic and Atmospheric Administration [NOAA] 1991).
- **Barium.** Barium (Ba) is a naturally occurring element. High levels can decrease fecundity.
- **Cadmium.** Cadmium (Cd) is used principally in electroplating, batteries, pigments, plastic stabilizers, photovoltaic devices, and alloys. It is ubiquitous in the environment. Cadmium is of concern due to its high toxicity and bioavailability. High levels of cadmium are associated with high mortality, reduced growth, inhibited reproduction, and other adverse effects (NOAA 1991).
- **Chromium.** Chromium (Cr) is used in electroplating, steelmaking, photography, and some chemical syntheses. Chromium has been shown to bioaccumulate in fish (U.S. EPA 1978). Chromium inhibits growth in duckweed and algae, and reduces survival and fecundity in benthic macroinvertebrates. It is a carcinogen, teratogen, and mutagen (Eisler 1986).
- **Lead.** Potential sources of Lead (Pb) include mining, ore processing, smelting, refining, and exhaust emissions from combustion engines. Lead is used in construction material linings, X-ray and atomic radiation protection, storage batteries,

solder and lead alloys, ceramics, plastics, electronic devices, and as a gasoline additive. Lead in soil is relatively unavailable to plants, except under acidic conditions, and the majority of the absorbed lead is retained in the root system. Because of the low availability to plants and internal immobility, phytotoxicity is rarely observed (Kabata-Pendias and Pendias 1992). Lead has shown moderate ability to bioaccumulate in fish (OMOE 1992). In animals, lead can modify the function and structure of kidneys, bones, the central nervous system, and the hematopoietic system (NOAA 1991). Lead poisoning in higher organisms primarily affects hematologic and neurologic processes. Lead can also impair growth, decrease fecundity, and increase mortality rates (Eisler 1988).

- **Mercury.** Mercury (Hg) is primarily used in electrical apparatus, paint manufacturing, industrial instruments, dental preparations, and in the production of chlorine, caustics, catalysts, fungicides, bactericides, and pharmaceuticals. The effects of mercury bioaccumulation in fish and shellfish are well documented, as evident in consumption limitations in areas with mercury contamination. Methylmercury has been shown to be the hazardous form of mercury in edible tissues of fish. Bacteria common to most natural waters have been proven capable of converting many mercury compounds to methylmercury. Therefore, virtually any mercury compound entering water may become a bioaccumulation hazard if the environmental conditions are favorable for methylation (U.S. EPA 1978). Mercury displays very high acute toxicity to fish and other aquatic organisms. Mercury is the most toxic trace metal to aquatic organisms and that toxicity is increased in the presence of zinc and lead (NOAA 1991).
- **PCBs.** Polychlorinated biphenyls (PCBs) are chlorinated organic compounds that were once used for numerous purposes including as a dielectric fluid in electrical transformers. Current releases are from landfills containing PCB waste material, incineration of PCB-containing materials, and from improper disposal of materials, such as waste transformer fluids. PCBs are highly stable and cycle through the environment through evaporation, transport, deposition, and reevaporation. PCBs have been reported to bioconcentrate in fish tissues in the range of 1,076 to over 200,000 times. PCBs demonstrate very high acute and chronic toxicity to aquatic organisms, are well established as animal carcinogens, and are probable human carcinogens (OMOE 1992).
- **PAHs.** Polyaromatic hydrocarbons (PAHs) are semivolatile organic pollutants associated with emissions from the burning of fuels. PAHs have been reported to bioconcentrate in fish tissues. A number of PAHs demonstrate very high acute aquatic toxicity to freshwater invertebrates. Chronic aquatic toxicity is also relatively high. Some PAHs (e.g., benzo(a)pyrene) have been shown to be carcinogenic to experimental animals and are thought to be human carcinogens (OMOE 1992).
- **Dioxin.** Dioxin is a byproduct in the production of pesticides and herbicides, and can exist in soot, incinerator fly ash, and industrial wastes. Exceptionally low doses of this compound elicit a wide range of toxic responses in many animals, including: adverse reproductive effects, thymic atrophy, and a "wasting syndrome" leading to death (OMOE 1992). Dioxins are thought to be among the most potent animal carcinogens evaluated by U.S. EPA to date.

2.2.5 Interaction

The presence of more than one contaminant may compound the harmful effects on an organism. For example, if a marginal level of lead and mercury both occur in one area, severe harmful effects on organisms may occur. Also, the presence of one contaminant may decrease the effectiveness an organism has with dealing with another contaminant.



Quadrangle Location



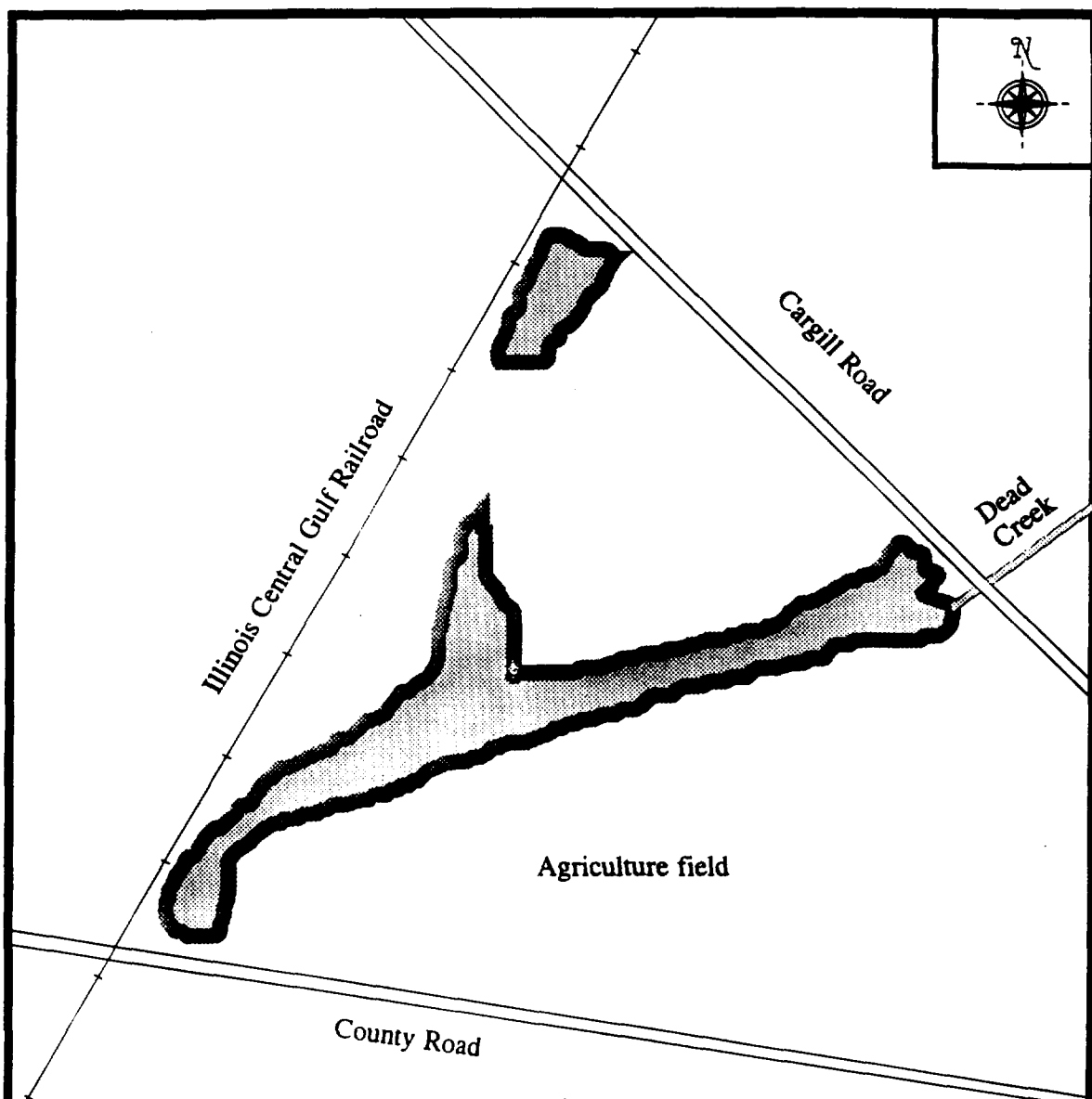
Illinois




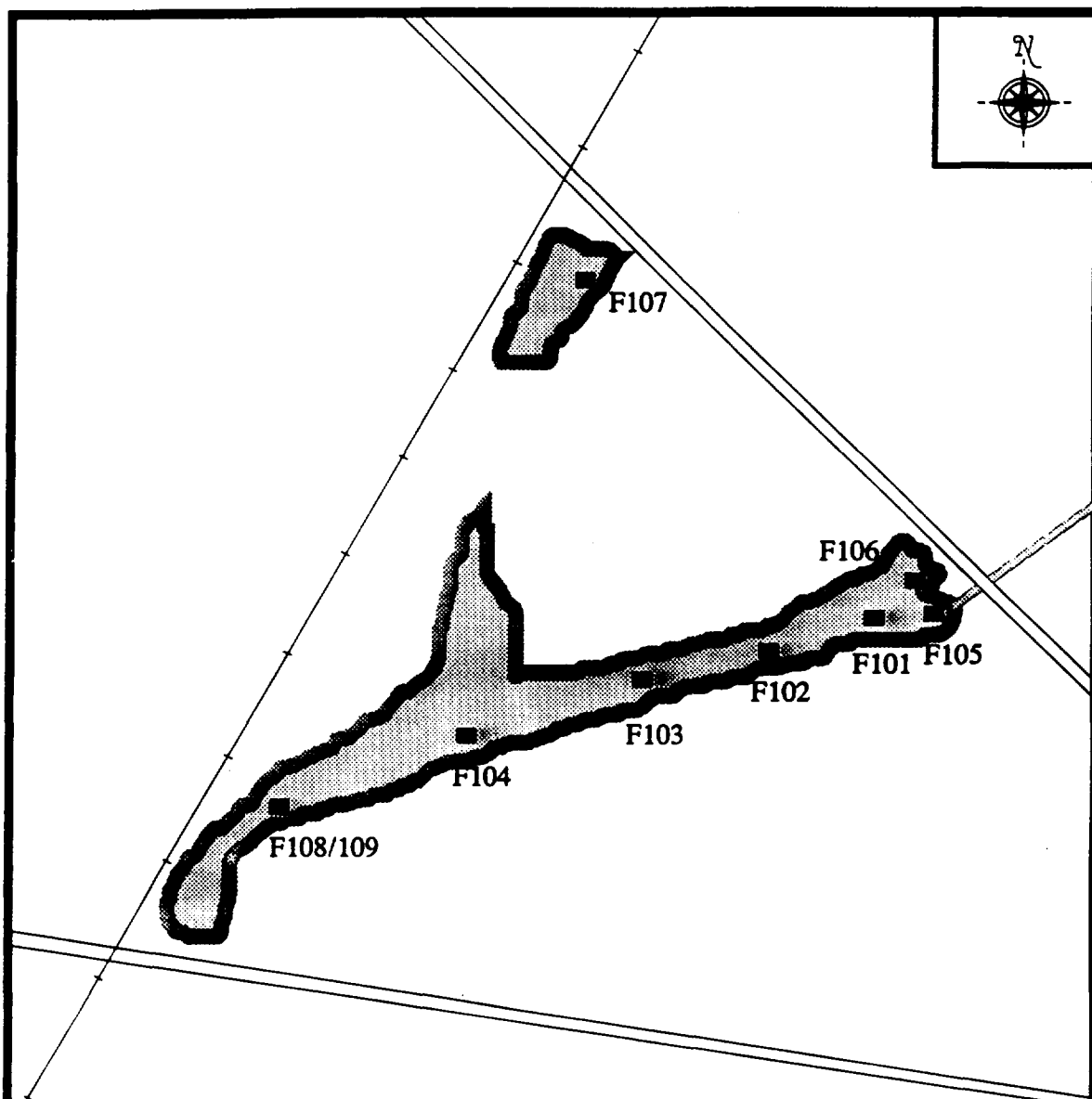
ecology and environment, inc.
Superfund Technical Assessment and Response Team
Region 5

33 North Dearborn Street, Chicago, Illinois 60602

TITLE	Site Location Map	FIGURE #	2-1
SITE	Sauget Area 1	SCALE	1:24000
CITY	Sauget	STATE	Illinois
SOURCE	USGS Topographical Map, 7.5' Series	TDD	S05-9703-012
	Quadrangle: Cahokia, Illinois	DATE	1980



<p>Legend</p> <p>▣ Trees and shrubs</p> <p>□ Wetland</p> <p>—+— Railroad</p>	<p> ecology and environment, inc. Superfund Technical Assessment and Response Team Region 5 33 North Dearborn Street, Chicago, Illinois 60602</p>	
	<p>TITLE Site Features Map</p>	<p>FIGURE # 2-2</p>
	<p>SITE Sauget Area 1</p>	<p>SCALE Not to scale</p>
	<p>CITY Sauget STATE Illinois</p>	<p>TDD S05-9703-012</p>
	<p>SOURCE Ecology and Environment, Inc.</p>	<p>DATE 1997</p>



Legend

■ Sample location



ecology and environment, inc.
Superfund Technical Assessment and Response Team
Region 5

33 North Dearborn Street, Chicago, Illinois 60602

TITLE Sample Location Map		FIGURE # 2-3
SITE Sauget Area 1		SCALE Not to scale
CITY Sauget	STATE Illinois	TDD S05-9703-012
SOURCE Ecology and Environment, Inc.		DATE 1997

<p align="center">Table 2-1</p> <p align="center">COMPARISON OF SITE SEDIMENT DATA WITH NONREGULATORY SEDIMENT QUALITY CRITERIA</p> <p align="center">SAUGET AREA 1</p> <p align="center">SAUGET, ILLINOIS</p> <p align="center">APRIL 18, 1997</p>						
Parameter	Maximum Detection ^a (mg/kg)	Risk- Based Level ^b (mg/kg)	SQC (mg/kg)		Hazard Quotient ^c (no units)	
			LEL	SEL	LEL	SEL
Arsenic	276	310	6.0	33.0	46.0	8.4
Barium	228	72,000	NA	NA	NA	NA
Cadmium	16.3	510	0.6	10.0	27.2	1.6
Chromium	44.2	5,100	26.0	110	1.7	0.4
Lead	199	NA	31.0	250	6.4	0.8
Mercury	0.55	310	0.2	2.0	2.8	0.3
Aroclor-1254	2.1	NA	0.06	34.0	35.0	0.1
Benzo(b)fluoranthene	0.63	3.9	NA	NA	NA	NA
Benzo(g,h,i)perylene	0.52	NA	0.170	320	3.1	0.0
Fluoranthene	0.62	41,000	0.750	1020	0.8	0.0
Indeno(1,2,3-cd)pyrene	0.50	NA	0.200	320	2.5	0.0

Key:

^a = Refers to the highest level of contaminant detected in the samples collected during the assessment.

^b = Human health risk-based concentrations for industrial soil (U.S. EPA 1993b).

^c = Sample concentration/SQC.

SQC = Sediment Quality Criteria: Based on the Ontario Provincial Sediment Guidelines (Persaud, et al. 1994).

LEL = Lowest Effect Level: Refers to marginally polluted sediments in which ecotoxic effects become apparent, but the majority of sediment-dwelling organisms are not affected.

SEL = Severe Effect Level: Refers to heavily polluted sediments likely to affect the health of sediment-dwelling organisms.

mg/kg = Milligrams per kilogram.

NA = Not available.

Source: EIS Analytical Services, South Bend, Indiana; Analytical TDD S05-9704-806.

<p align="center">Table 2-2</p> <p align="center">COMPARISON OF SITE SEDIMENT DIOXIN DATA WITH NONREGULATORY ECOLOGICAL RISK CRITERIA^a</p> <p align="center">SAUGET AREA 1</p> <p align="center">SAUGET, ILLINOIS</p> <p align="center">APRIL 18, 1997</p>								
Maximum Detection^b (pg/g)	Avian Risk (pg/g)		Hazard Quotient^c (no units)		Mammalian Risk (pg/g)		Hazard Quotient^c (no units)	
	Low	High	Low	High	Low	High	Low	High
211	21	210	10.0	1.0	2.5	25.0	84.4	8.4

Key:

^a = The analytical results for dioxin listed in this table were converted to dioxin 2,3,7,8-TCDD equivalent. This maximum detection is compared with sediment benchmark values obtained from U.S. EPA 1993. The values listed under "Low" represent a concentration derived from no-effects thresholds for reproductive effects in avian and mammalian wildlife. The values under "High" represent a concentration derived from doses expected to cause 50 to 100% mortality in embryos and young of sensitive avian and mammalian species.

^b = Refers to the highest level of contaminant detected in the samples collected during the assessment.

^c = Sample concentration/risk value.

pg/g = Picograms per gram.

Source: EIA Analytical Services, South Bend, Indiana; Analytical TDD S05-9704-806.

3. Conclusions and Recommendations

Based on this investigation, site contamination does not appear to threaten human health. Sediment contamination levels are below the risk-based values and few people enter the site boundaries.

Elevated levels of metals and PCBs may be highly detrimental to the ecology of this site. The presence of arsenic, cadmium, and dioxin greater than the SEL guideline may decrease the species richness of the area. Sensitive species, including the endangered Black-Crowned Night Heron, inhabit the site and therefore, are subject to effects such as acute toxicity, reduced growth, inhibited reproduction, and other adverse effects. Finally, species that feed on contaminated organisms may bioaccumulate the contaminants and become adversely affected.

The contamination on the site warrants further investigation and possible remediation, especially because it provides high quality wetland habitat.

4. References

- Bohlen, H., 1989, *The Birds of Illinois*, Indiana University Press, Bloomington, Indiana.
- Chapman, J., June 3, 1997, personal communication, Ecologist, Technical Support Section, U.S. EPA Region 5, Memorandum to Damon Sinars, Ecology and Environment, Inc., Chicago, Illinois.
- Conant, R. and J. Collins, 1991, *A Field Guide to Reptile and Amphibians, Eastern and Central North America*, Third Ed., Houghton Mifflin Co., Boston, Massachusetts.
- Dunn, G., 1996, *Insects of the Great Lakes Region*, University of Michigan Press, Ann Arbor, Michigan.
- Eisler, R., 1986, Chromium Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review, *Biological Report* 85(1.6), U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.
- Eisler, R., 1988, Lead Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review, *Biological Report* 85(1.6), U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.
- Gleason, H.A. and A. Cronquist, 1991, *Manual of Vascular Plants of Northeastern United States and Adjacent Canada*, Second Ed., New York Botanical Garden, Bronx, New York.
- Herkert, J., 1991, *Endangered and Threatened Species of Illinois: Status and Distribution*, Vol. 1 - Plants, Illinois Endangered Species Protection Board, Springfield, Illinois.
- Kabata-Pendias, A. and H. Pendias, 1992, *Trace Elements in Soils and Plants*, Second Ed., CRC Press, Boca Raton, California.
- Kurta, A., 1995, *Mammals of the Great Lakes Region*, Revised Ed., University of Michigan Press, Ann Arbor, Michigan.
- National Oceanic and Atmospheric Administration (NOAA), 1991, The Potential for Biological Effects of Sediment-sorbed Contaminants Tested in the National Status and Trends Program, Technical Memorandum. NOS OMA 52.

Ontario Ministry of the Environment (OMOE), 1992, Candidate Substance List for Bans or Phase-outs, PIBS 1921E, Ontario, Canada.

Persuad, D., J. Jaagumagi, and A. Hayton, 1993, Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario, PIBS 1962, Ministry of Environment and Energy, Toronto, Ontario, Canada.

Peterson, R., 1980, *A Field Guide to the Birds of Eastern and Central North America*, Houghton Mifflin Co., Boston, Massachusetts.

U.S. EPA, 1978, Metal Bioaccumulation in Fishes and Aquatic Invertebrates: A Literature Review, EPA-600-3-78-103.

U.S. EPA, 1993, Interim Report on Data and Methods for Assessment of 2,3,7,8-tetrachlorodibenzo-p-dioxin Risks to Aquatic Life and Associated Wildlife, EPA-600-R-93-055.

U.S. EPA, 1993b, Risk-based Concentration Table, Third Quarter 1993, July 9 Memorandum from Roy L. Smith, Technical Support Section, Region 3, Philadelphia, Pennsylvania.

Appendix A

Photodocumentation



SITE NAME: Sauget Area 1

TDD: S05-9703-012

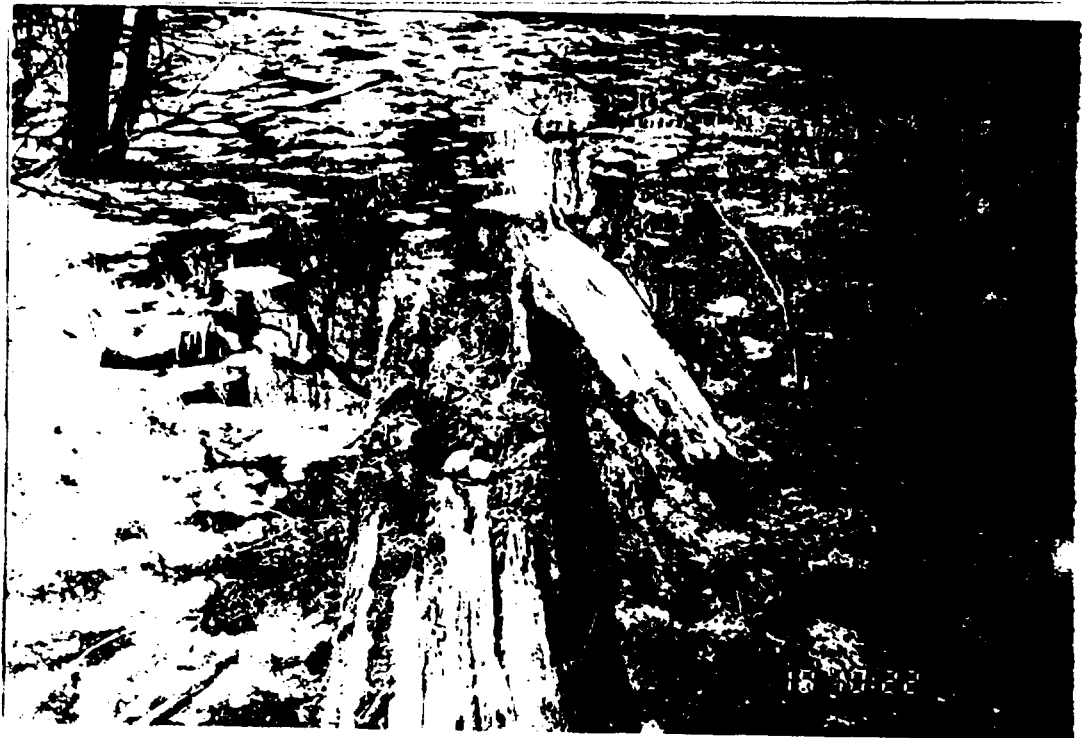
PHOTOGRAPHER: D. Sinars

DATE: April 18, 1997

TIME: 0859

DIRECTION: Southwest

SUBJECT: Area where Dead Creek flows into wetland.



SITE NAME: Sauget Area 1

TDD: S05-9703-012

PHOTOGRAPHER: S. Borries

DATE: April 18, 1997

TIME: 1022

DIRECTION: North

SUBJECT: Canada geese nest and bucket near sample F101.



SITE NAME: Sauget Area 1 **TDD:** S05-9703-012 **PHOTOGRAPHER:** D. Robin
DATE: April 18, 1997 **TIME:** 1031 **DIRECTION:** West
SUBJECT: START Sinars using shovel to sample F102; evidence of beavers in background.



SITE NAME: Sauget Area 1 **TDD:** S05-9703-012 **PHOTOGRAPHER:** D. Robin
DATE: April 18, 1997 **TIME:** 1215 **DIRECTION:** North
SUBJECT: START Sinars using a corer to sample F106; debris along Cargill Road in background.

Appendix B

Species List

The following species list was compiled based on observations made by James Chapman, Ph.D., Ecologist, Technical Support Section of Region 5 U.S. EPA, during the assessment of Sauget Area 1, Creek Segment F on April 18, 1997 (Chapman 1997). This is not a comprehensive biological survey. Species listed are the common, obvious species encountered near the site in early spring. Species names are based on the following texts: plants, Gleason and Cronquist 1991; birds, Peterson 1980 and Bohlen 1989; mammals, Kurta 1995; herptiles, Conant and Collins 1991; and insects, Dunn 1996 (see References, Section 4).

Aquatic Vegetation:

Lesser Duckweed, *Lemna minor*
Unidentified filamentous green algae and periphyton

Aquatic Insects:

Water Boatman (*Corixidae*)

Herptiles:

Painted Turtles, *Chrysemys picta* (approximately 100, sunning on the northeast wetland extension above the confluence with Dead Creek)

Aquatic Birds:

Black-Crowned Night Heron, *Nycticorax nycticorax*, a state-listed endangered species (three individuals at the northeast wetland extension above the confluence with Dead Creek)
Belted Kingfisher, *Megasceryle alcyon*
Canada Goose, *Branta canadensis* (nesting pair near confluence, flock on northwest backwater)
American Coot, *Fulica americana*

Riparian/Terrestrial Vegetation:

Cottonwood, *Populus deltoides* (dominant overstory species)
Boxelder, *Acer negundo*
Silver Maple, *Acer saccharinum*
Sycamore, *Plantanus occidentalis*
Elm, *Ulmus* sp. (saplings)
Wild Black Cherry, *Prunus serotina*
Dogwood, *Cornus* sp.
Willow, *Salix* spp.
Nettle, *Urtica* sp.
Bramble, *Rubus* sp.
Poison Ivy, *Toxicodendron radicans*
Grape, *Vitis* sp.
Trumpet-creeper, *Campsis radicans*

Riparian/Terrestrial Vegetation, continued:

Onion, *Allium* sp.
Cleavers, *Galium aparine*
Horsetail, *Equisetum* sp.
Gill-over-the-ground, *Glechoma hederacea*
Dooryard (common blue) violet, *Viola sororia* (=papilionacea)
Wild White Violet, *Viola macloskeyi* (=pallens)
Field Penny-Cress, *Thlaspi arvense*
Short-Spurred Corydalis, *Corydalis flavula*
Sedges (Cyperaceae)

Birds:

Red-Winged Blackbirds, *Agelaius phoeniceus*
Robin, *Turdus migratorius*
Northern Cardinal, *Cardinalis cardinalis*
White-Throated Sparrow, *Zonotrichia albicollis*
Mourning Dove, *Zenaida macroura*
Common Flicker, *Colaptes auratus*
Blue-Gray Gnatcatcher, *Poliophtila caerulea*

Mammals:

American Beaver, *Castor canadensis* (dam and vegetation marks)
White-Tailed Deer, *Odocoileus virginianus*
Common Raccoon, *Procyon lotor* (tracks)
Red Fox, *Vulpes vulpes* (tracks)
Domestic Dog, *Canis familiaris* (tracks)

Appendix C

Analytical Results

- **Data Summary Tables**
 - C-1: Metals Data Summary
 - C-2: PCB Data Summary
 - C-3: PAH Data Summary
 - C-4: Dioxin Data Summary
- **Data Validation Memoranda**
- **Laboratory Analytical Package**

<p align="center">Table C-1</p> <p align="center">METALS DATA SUMMARY</p> <p align="center">SAUGET AREA 1</p> <p align="center">SAUGET, ILLINOIS</p> <p align="center">APRIL 18, 1997</p> <p align="center">(units = mg/kg)</p>								
Sample	Parameter							
	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
F101	232	145	ND	44.2	41.2	ND	ND	ND
F102	187	162	4.56	29.0	199	0.24	ND	ND
F103	213	179	8.29	43.8	111	0.30	ND	ND
F104	276	228	16.3	27.2	124	0.55	ND	ND
F105	166	116	ND	12.6	56.2	ND	ND	ND
F106	160	133	ND	12.1	28.3	ND	ND	ND
F107	144	137	ND	10.4	28.2	ND	ND	ND
F108	199	138	ND	14.9	45.7	0.12	ND	ND
F109	160	163	ND	13.9	50.2	0.11	ND	ND

Key:
 ND = Non detect.
 mg/kg = Milligrams per kilogram.

Source: EIS Analytical Services, South Bend, Indiana; Analytical TDD S05-9704-806.

Table C-2 PCB DATA SUMMARY SAUGET AREA 1 SAUGET, ILLINOIS APRIL 18, 1997 (units = mg/kg)			
Sample	Parameter		
	PCB-1254	PCB-1248	PCB-1260
F101	ND	ND	ND
F102	2.1	ND	ND
F103	0.50	ND	ND
F104	0.52	ND	ND
F105	ND	ND	ND
F106	ND	ND	ND
F107	ND	ND	ND
F108	ND	ND	ND

Key:

ND = Non detect.

mg/kg = Milligrams per kilogram.

Source: EIS Analytical Services, South Bend, Indiana; Analytical TDD S05-9704-806.

Table C-3 PAH DATA SUMMARY SAUGET AREA 1 SAUGET, ILLINOIS APRIL 18, 1997 (units = mg/kg)	
Parameter	Sample F105
Benzo(b)fluoranthene	0.63
Benzo(ghi)perylene	0.52
Fluoranthene	0.62
Indeno(1,2,3-cd)pyrene	0.50

Key:
mg/kg = Milligrams per kilogram.

Source: EIS Analytical Services, South Bend, Indiana; Analytical TDD S05-9704-806.

Table C-4 DIOXIN DATA SUMMARY* SAUGET AREA 1 SAUGET, ILLINOIS APRIL 18, 1997 (units = pg/g)	
Sample	Concentration
F301	11.5
F302	211
F305	53.4
F307	2.29

Key:

* = Dioxin results were converted to dioxin 2,3,7,8-TCDD equivalent.
pg/g = Picograms per gram.

Source: EIS Analytical Services, South Bend, Indiana; Analytical TDD S05-9704-806.



ecology and environment, inc.

International Specialists in the Environment

33 North Dearborn Street
Chicago, Illinois 60602
Tel. 312/578-9243, Fax: 312/578-9345

M E M O R A N D U M

DATE: June 23, 1997

TO: Damon Sinars, START Project Manager, E & E, Chicago, Illinois

FROM: Lisa Graczyk, START Chemist, E & E, Chicago, Illinois

THROUGH: Dave Hendren, START Analytical Services Manager, E & E, Chicago, Illinois

SUBJECT: Data Quality Review for Polynuclear Aromatic Hydrocarbons (PAH), Sauget Area One, Sauget, St. Clair County, Illinois

REFERENCE: Project TDD S05-9703-012 Analytical TDD S05-9704-806
Project PAN 7M1201SIXX Analytical PAN 7AAF01TAXX

The data quality assurance (QA) review of five sediment samples collected from the Sauget Area One site is complete. The samples were collected on April 18, 1997, by the Superfund Technical Assessment and Response Team (START) contractor, Ecology and Environment, Inc. (E & E). The samples were submitted to EIS Analytical Services, Inc., South Bend, Indiana, for analyses. The laboratory analyses were performed according to the following United States Environmental Protection Agency (U.S. EPA) Solid Waste 846 Methods: 3540 for extraction; and 8270 for PAH analysis.

Sample Identification

<u>START</u> <u>Identification No.</u>	<u>Laboratory</u> <u>Identification No.</u>
F101	042083
F102	042084
F105	042087
F106	042088
F107	042089

Sauget Area One
Project TDD S05-9703-012
Analytical TDD S05-9704-806
PAH
Page 2

Data Qualifications:

I. Sample Holding Time: Acceptable

The samples were collected on April 18, 1997. The samples were extracted on April 23, 1997 and analyzed on April 24, 1997. This is within the 14-day holding time limit, from collection to extraction, and 40-day limit from extraction to analysis.

II. Gas Chromatography/Mass Spectrometry (GC/MS) Tuning: Acceptable

GC/MS tuning to meet ion abundance criteria using decafluorotriphenylphosphine (DFTPP) was acceptable and samples were analyzed within 12 hours of DFTPP tuning.

III. Calibrations:

• Initial Calibration: Acceptable

A five-point initial calibration was performed prior to analysis. All target compounds had relative response factors of at least 0.05. The percent relative standard deviations (%RSDs) between response factors were less than 30% for all target compounds.

• Continuing Calibration: Acceptable

The percent differences of the response factors were less than 25%, as required for target compounds.

IV. Blank: Acceptable

A method blank was analyzed with the samples. No target compounds were detected in the blank.

V. Internal Standards: Acceptable

The areas of the internal standards in the samples were within -50% to +100% of the associated calibration check standards. The retention times of the internal standards were within the 30-second control limit.

VI. Compound Identification: Acceptable

The mass spectra and retention times of the detected compounds in the samples matched those of the standards.

Sauget Area One
Project TDD S05-9703-012
Analytical TDD S05-9704-806
PAH
Page 3

VII. Overall Assessment of Data for Use: Acceptable

The overall usefulness of the data is based on criteria for QA Level II as outlined in the Office of Solid Waste and Emergency Response (OSWER) Directive 9360.4-01 (April 1990), Data Validation Procedures, Section 4.0, BNAs by GC/MS Analysis. Based upon the information provided, the data are acceptable for use.



ecology and environment. inc.

International Specialists in the Environment

33 North Dearborn Street
Chicago, Illinois 60602
Tel. 312/578-9243, Fax: 312/578-9345

M E M O R A N D U M

DATE: June 23, 1997

TO: Damon Sinars, START Project Manager, E & E, Chicago, Illinois

FROM: Lisa Graczyk, START Chemist, E & E, Chicago, Illinois

THROUGH: Dave Hendren, START Analytical Services Manager, E & E, Chicago, Illinois

SUBJECT: Data Quality Review for Polychlorinated Biphenyls (PCBs) and Pesticides, Sauget Area One, Sauget, St. Clair County, Illinois

REFERENCE: Project TDD S05-9703-012 Analytical TDD S05-9704-806
Project PAN 7M1201SIXX Analytical PAN 7AAF01TAXX

The data quality assurance (QA) review of nine sediment samples collected from the Sauget Area One site is complete. The samples were collected on April 18, 1997, by the Superfund Technical Assessment and Response Team (START) contractor, Ecology and Environment, Inc. (E & E). The samples were submitted to EIS Analytical Services, Inc, South Bend, Indiana, for analyses. The laboratory analyses were performed according to the United States Environmental Protection Agency (U.S. EPA) Solid Waste 846 Methods 3540B for extraction and 8081 for PCB/Pesticide analysis.

Sample Identification

<u>START</u> <u>Identification No.</u>	<u>Laboratory</u> <u>Identification No.</u>	<u>Parameter</u>
F101	042083	PCBs
F102	042084	PCB/Pesticides
F103	042085	PCB/Pesticides
F104	042086	PCB/Pesticides
F105	042087	PCBs
F106	042088	PCBs
F107	042089	PCB/Pesticides
F108	042090	PCBs
F109	042091	PCBs

Sauget Area One
Project TDD S05-9703-012
Analytical TDD S05-9704-806
PCB/Pesticides
Page 2

Data Qualifications:

I. Sample Holding Time: Acceptable

The samples were collected on April 18, 1997, extracted on April 24, 1997, and analyzed on April 25 and 26, 1997. This is within the 14-day holding time limit, from collection to extraction, and 40-day limit from extraction to analysis.

II. Instrument Performance: Acceptable

The chromatographic resolution was adequate in the standard and sample chromatograms. DDT retention time was greater than 12 minutes in the standard chromatograms. Retention time windows were reported and standards were in the established windows. Surrogate retention times were consistent in the samples and standards.

III. Calibrations:

• Initial Calibration: Acceptable

A five-point initial calibration was performed prior to analysis. The percent relative standard deviations (%RSD) of calibration factors in the initial linearity check were less than 20%.

• Continuing Calibration: Acceptable

The percent differences of the response factors were less than 15% for detected compounds.

IV. Blank: Acceptable

A method blank was analyzed with the sample. No target compounds or contaminants were detected in the blank.

V. Compound Identification: Acceptable

Detected PCBs in the samples appeared to match the "fingerprint" pattern of the standard chromatograms and were confirmed on a second GC column.

Sauget Area One
Project TDD S05-9703-012
Analytical TDD S05-9704-806
PCB/Pesticides
Page 3

VI. Additional QC Checks: Acceptable

The surrogate recoveries were within the control limits established by the laboratory.

VII. Overall Assessment of Data for Use: Acceptable

The overall usefulness of the data is based on criteria for QA Level II as outlined in the Office of Solid Waste and Emergency Response (OSWER) Directive 9360.4-01 (April 1990), Data Validation Procedures, Section 6.0, Pesticides/PCBs. Based upon the information provided, the data are acceptable for use.



ecology and environment, inc.

International Specialists in the Environment

33 North Dearborn Street
Chicago, Illinois 60602
Tel. 312/578-9243, Fax: 312/578-9345

M E M O R A N D U M

DATE: June 23, 1997

TO: Damon Sinars, START Project Manager, E & E, Chicago, Illinois

FROM: Lisa Graczyk, START Chemist, E & E, Chicago, Illinois

THROUGH: Dave Hendren, START Analytical Services Manager, E & E, Chicago, Illinois

SUBJECT: Inorganic Data Quality Review for Resource Conservation and Recovery Act (RCRA) Metals, Sauget Area One, Sauget, St. Clair County, Illinois

REFERENCE: Project TDD S05-9703-012 Analytical TDD S05-9704-806
Project PAN 7M1201SIXX Analytical PAN 7AAF01TAXX

The data quality assurance (QA) review of nine sediment samples collected from the Sauget Area One site is complete. The samples were collected on April 18, 1997, by the Superfund Technical Assessment and Response Team (START) contractor, Ecology and Environment, Inc. (E & E). The samples were submitted to EIS Analytical Services, Inc., South Bend, Indiana, for analyses. The laboratory analyses were performed according to U.S. EPA solid Waste 846 Methods: 3005A for sample digestion; 6010 for arsenic, barium, cadmium, chromium, lead, selenium, and silver; and 7471 for mercury.

Sample Identification

<u>START</u> <u>Identification No.</u>	<u>Laboratory</u> <u>Identification No.</u>
F101	042083
F102	042084
F103	042085
F104	042086
F105	042087
F106	042088
F107	042089
F108	042090
F109	042091

Sauget Area One
Project TDD S05-9703-012
Analytical TDD S05-9704-806
RCRA Metals
Page 2

Data Qualifications:

I. Sample Holding Time: Acceptable

The samples were collected on April 18, 1997, and analyzed between April 28 and May 1, 1997. This is within the six month holding time limit (28 days for mercury).

II. Calibration:

• Initial Calibration: Qualified

Recoveries for the initial calibration verification were within 90 to 110% for analytes other than mercury, as required. Recoveries for mercury were not within the established limits of 80% to 120%. All positive results for mercury were flagged as "J" or estimated, as required.

• Continuing Calibration: Qualified

All analytes included in the continuing calibration verification standard were within 90 to 110% other than mercury, as required. The recovery for mercury was 77.5% which is outside the control limits of 80% to 120%. All positive results for mercury were flagged as "J" or estimated, as required.

III. Blanks: Acceptable

Calibration and preparation blanks were analyzed with each analytical batch. No target analytes were detected in the blanks. At least one blank was analyzed for each 20 samples.

IV. Interference Check Samples (ICSs): Acceptable

ICSs were analyzed and recoveries were acceptable.

V. Overall Assessment of Data for Use: Acceptable

The overall usefulness of the data is based on criteria for QA Level II as outlined in the Office of Solid Waste and Emergency Response (OSWER) Directive 9360.4-01 (April 1990) Data Validation Procedures, Section 3.0, Metallic Inorganic Parameters. Based upon the information provided, the data are acceptable for use.

Sauget Area One
Project TDD S05-9703-012
Analytical TDD S05-9704-806
RCRA Metals
Page 3

Data Qualifiers and Definitions:

J - The associated numerical value is an estimated quantity because the reported concentrations were less than the required detection limits or quality control criteria were not met.



ecology and environment, inc.

International Specialists in the Environment

33 North Dearborn Street
Chicago, Illinois 60602
Tel. 312/578-9243, Fax: 312/578-9345

M E M O R A N D U M

DATE: June 20, 1997

TO: Damon Sinars, START Project Manager, E & E, Chicago, Illinois

FROM: Lisa Graczyk, START Chemist, E & E, Chicago, Illinois

THROUGH: Dave Hendren, START Analytical Services Manager, E & E, Chicago, Illinois

SUBJECT: Miscellaneous Data Quality Review for Total Organic Carbon (TOC), Sauget Area One, Sauget, St. Clair County, Illinois

REFERENCE: Project TDD S05-9703-012 Analytical TDD S05-9704-806
Project PAN 7M1201SIXX Analytical PAN 7AAF01TAXX

The data quality assurance (QA) review of three sediment samples collected from the Sauget Area One site is complete. The samples were collected on April 18, 1997, by the Superfund Technical Assessment and Response Team (START) contractor, Ecology and Environment, Inc. (E & E). The samples were submitted to EIS Analytical Services, Inc., South Bend, Indiana. The laboratory analyses were performed according to United States Environmental Protection Agency (U.S. EPA) Solid Waste 846 method 9060 which was modified for sediment analysis.

Sample Identification

<u>START</u> <u>Identification No.</u>	<u>Laboratory</u> <u>Identification No.</u>
F102	042084
F103	042085
F104	042086

Sauget Area One
Project TDD S05-9703-012
Analytical TDD S05-9704-806
TOC
Page 2

Data Qualifications:

I. Sample Holding Time: Acceptable

The samples were collected on April 18, 1997 and analyzed on April 25, 1997. The Office of Solid Waste and Emergency Response (OSWER) Directive 9360.4-01 (April 1990) and SW846 method 9060 do not provide a holding time for TOC in sediments.

II. Calibrations: Acceptable

Method 9060 states to follow the instrument manufacturer's instructions on calibrating the instrument. No control limits are mentioned. The laboratory analyzed an initial calibration verification standard both before and after the analysis. The percent differences between true and received results were 3% and 5% respectively. This is acceptable.

III. Blanks: Acceptable

A blank was analyzed both before and after the analysis. No contaminants were found in the blank.

IV. Overall Assessment of Data for Use: Acceptable

The overall usefulness of the data is based on criteria for QA Level II as outlined in Data Validation Procedures, Section 9.0, Generic Data Validation Procedures as stated in OSWER Directive 9360.4-01 (April 1990). Based upon the information provided, the data are acceptable for use.



Mr David Hendren
Ecology & Environment, Inc.
33 North Dearborn, Suite 900
Chicago, IL 60602
Tel No: 312-578-9243
Fax No: 312-578-9345
PO No:
Project Name: Sauget Area

Report Date: 5/22/97
EIS Order No: 970400209
EIS Sample No: 042083
EIS Project No: 2009-1000-97

Client Sample ID: F101
Date Collected: 4/18/97
Date Received: 4/22/97
Collected By: DMS

This report presents results of analysis for your sample(s) received under our Order No above. This Number is to be used in all inquiries concerning this report. The EIS Sample No above, as well as your Sample ID, refer to the first sample in a multi-sample submission.

DEFINITIONS:

MDL = Method Detection Limit normally achieved in the absence of interferences or other matrix difficulties.

SDL = Sample Detection Limit achieved in your sample. If numerically greater than the MDL, dilutions were required in order to perform the analysis. If numerically less than the MDL, alternate techniques were employed.

CHAIN-OF-CUSTODY is enclosed if received with your sample submission.


QUALITY ASSURANCE OFFICER


LABORATORY DIRECTOR

The data in this report has been reviewed and complies with EIS Quality Control unless specifically addressed above.

SAMPLE RESULTS

Page 2 of 31

CLIENT SAMPLE ID: F101
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042083
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Arsenic, Total	232	mg/kg(wet)	5	5	ClearN	5/1/97	6010
Barium, Total	145	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Cadmium, Total	<1.0	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Chromium, Total	44.2	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Lead, Total	41.2	mg/kg(wet)	5	5	ClearN	4/28/97	6010
Mercury, Total	<0.1	mg/kg(wet)	0.1	0.2	ShaneD	4/30/97	7471
Selenium, Total	<5.0	mg/kg(wet)	5	5	ClearN	5/1/97	6010
Silver, Total	<2.0	mg/kg(wet)	1	1	ClearN	4/28/97	6010

SAMPLE RESULTS

Page 3 of 31

CLIENT SAMPLE ID: F101
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042083
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Acenaphthene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Acenaphthylene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Anthracene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(a)anthracene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(a)pyrene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(b)fluoranthene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(ghi)perylene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(k)fluoranthene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Chrysene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Dibenzo(a,h)anthracene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Fluoranthene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Fluorene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Indeno(1,2,3-cd)pyrene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Naphthalene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Phenanthrene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Pyrene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B

SAMPLE RESULTS

Page 4 of 31

CLIENT SAMPLE ID: F101
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042083
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
PCB (AR1016)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1221)	nd	mg/kg(wet)	0.2	0.2	KlepperW	4/25/97	8081
PCB (AR1232)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1242)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1248)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1254)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1260)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081

SAMPLE RESULTS

Page 5 of 31

CLIENT SAMPLE ID: F102
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042084
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Total Organic Carbon (TOC)	26600	mg/kg(wet)	5	5	BaunG	4/28/97	9060 M

SAMPLE RESULTS

Page 6 of 31

CLIENT SAMPLE ID: F102
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042084
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Arsenic, Total	187	mg/kg(wet)	5	5	ClearN	5/1/97	6010
Barium, Total	162	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Cadmium, Total	4.56	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Chromium, Total	29.0	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Lead, Total	199	mg/kg(wet)	5	5	ClearN	4/28/97	6010
Mercury, Total	0.24J	mg/kg(wet)	0.1	0.2	ShaneD	4/30/97	7471
Selenium, Total	<5.0	mg/kg(wet)	5	5	ClearN	5/1/97	6010
Silver, Total	<2.0	mg/kg(wet)	1	1	ClearN	4/28/97	6010

SAMPLE RESULTS

Page 7 of 31

CLIENT SAMPLE ID: F102
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042084
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Acenaphthene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Acenaphthylene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Anthracene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(a)anthracene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(a)pyrene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(b)fluoranthene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(ghi)perylene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(k)fluoranthene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Chrysene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Dibenzo(a,h)anthracene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Fluoranthene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Fluorene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Indeno(1,2,3-cd)pyrene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Naphthalene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Phenanthrene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Pyrene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B

SAMPLE RESULTS

Page 8 of 31

CLIENT SAMPLE ID: F102
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042084
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
PCB (AR1016)	nd	mg/kg(wet)	0.5	0.1	CarmichaelJ	4/26/97	8081
PCB (AR1221)	nd	mg/kg(wet)	1	0.2	CarmichaelJ	4/26/97	8081
PCB (AR1232)	nd	mg/kg(wet)	0.5	0.1	CarmichaelJ	4/26/97	8081
PCB (AR1242)	nd	mg/kg(wet)	0.5	0.1	CarmichaelJ	4/26/97	8081
PCB (AR1248)	nd	mg/kg(wet)	0.5	0.1	CarmichaelJ	4/26/97	8081
PCB (AR1254)	2.1	mg/kg(wet)	0.5	0.1	CarmichaelJ	4/26/97	8081
PCB (AR1260)	nd	mg/kg(wet)	0.5	0.1	CarmichaelJ	4/26/97	8081

SAMPLE RESULTS

Page 9 of 31

CLIENT SAMPLE ID: F102
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042084
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Aldrin	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Chlordane(alpha)	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Chlordane(gamma)	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Dieldrin	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Endosulfan I	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Endosulfan II	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Endosulfan sulfate	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Endrin	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Endrin aldehyde	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Endrin ketone	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Heptachlor	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Hexachlorocyclohexane (alpha-BHC)	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Hexachlorocyclohexane (beta-BHC)	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Hexachlorocyclohexane (delta-BHC)	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Hexachlorocyclohexane (gamma-BHC)	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Methoxychlor	nd	mg/kg(wet)	0.25	0.005	CarmichaelJ	4/26/97	8081
P,P'-DDD	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
P,P'-DDE	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
P,P'-DDT	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Toxaphene	nd	mg/kg(wet)	2.5	0.2	CarmichaelJ	4/26/97	8081

SAMPLE RESULTS

Page 10 of 31

CLIENT SAMPLE ID: F103
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042085
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Total Organic Carbon (TOC)	16900	mg/kg(wet)	5	5	BaunG	4/28/97	9060 M

SAMPLE RESULTS

Page 11 of 31

CLIENT SAMPLE ID: F103
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042085
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Arsenic, Total	213	mg/kg(wet)	5	5	ClearN	5/1/97	6010
Barium, Total	179	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Cadmium, Total	8.29	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Chromium, Total	43.8	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Lead, Total	111	mg/kg(wet)	5	5	ClearN	4/28/97	6010
Mercury, Total	0.30 J	mg/kg(wet)	0.1	0.2	ShaneD	4/30/97	7471
Selenium, Total	<5.0	mg/kg(wet)	5	5	ClearN	5/1/97	6010
Silver, Total	<2.0	mg/kg(wet)	1	1	ClearN	4/28/97	6010

SAMPLE RESULTS

Page 12 of 31

CLIENT SAMPLE ID: F103
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042085
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
PCB (AR1016)	nd	mg/kg(wet)	0.1	0.1	CarmichaelJ	4/26/97	8081
PCB (AR1221)	nd	mg/kg(wet)	0.2	0.2	CarmichaelJ	4/26/97	8081
PCB (AR1232)	nd	mg/kg(wet)	0.1	0.1	CarmichaelJ	4/26/97	8081
PCB (AR1242)	nd	mg/kg(wet)	0.1	0.1	CarmichaelJ	4/26/97	8081
PCB (AR1248)	nd	mg/kg(wet)	0.1	0.1	CarmichaelJ	4/26/97	8081
PCB (AR1254)	0.50	mg/kg(wet)	0.1	0.1	CarmichaelJ	4/26/97	8081
PCB (AR1260)	nd	mg/kg(wet)	0.1	0.1	CarmichaelJ	4/26/97	8081

SAMPLE RESULTS

Page 13 of 31

CLIENT SAMPLE ID: F103
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042085
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Aldrin	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Chlordane(alpha)	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Chlordane(gamma)	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Dieldrin	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Endosulfan I	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Endosulfan II	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Endosulfan sulfate	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Endrin	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Endrin aldehyde	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Endrin ketone	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Heptachlor	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Hexachlorocyclohexane (alpha-BHC)	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Hexachlorocyclohexane (beta-BHC)	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Hexachlorocyclohexane (delta-BHC)	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Hexachlorocyclohexane (gamma-BHC)	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Methoxychlor	nd	mg/kg(wet)	0.25	0.005	CarmichaelJ	4/26/97	8081
P,P'-DDD	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
P,P'-DDE	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
P,P'-DDT	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Toxaphene	nd	mg/kg(wet)	2.5	0.2	CarmichaelJ	4/26/97	8081

SAMPLE RESULTS

Page 14 of 31

CLIENT SAMPLE ID: F104
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042086
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Total Organic Carbon (TOC)	17600	mg/kg(wet)	5	5	BaunG	4/28/97	9060 M

SAMPLE RESULTS

Page 15 of 31

CLIENT SAMPLE ID: F104
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042086
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Arsenic, Total	276	mg/kg(wet)	5	5	ClearN	5/1/97	6010
Barium, Total	228	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Cadmium, Total	16.3	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Chromium, Total	27.2	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Lead, Total	124	mg/kg(wet)	5	5	ClearN	4/28/97	6010
Mercury, Total	0.55J	mg/kg(wet)	0.11	0.2	ShaneD	4/30/97	7471
Selenium, Total	<5.0	mg/kg(wet)	5	5	ClearN	5/1/97	6010
Silver, Total	<2.0	mg/kg(wet)	1	1	ClearN	4/28/97	6010

SAMPLE RESULTS

Page 16 of 31

CLIENT SAMPLE ID: F104
 Date Collected: 4/18/97
 Date Received: 4/22/97

Report Date: 5/22/97
 EIS Sample No: 042086
 EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
PCB (AR1016)	nd	mg/kg(wet)	0.1	0.1	CarmichaelJ	4/28/97	8081
PCB (AR1221)	nd	mg/kg(wet)	0.2	0.2	CarmichaelJ	4/28/97	8081
PCB (AR1232)	nd	mg/kg(wet)	0.1	0.1	CarmichaelJ	4/28/97	8081
PCB (AR1242)	nd	mg/kg(wet)	0.1	0.1	CarmichaelJ	4/28/97	8081
PCB (AR1248)	nd	mg/kg(wet)	0.1	0.1	CarmichaelJ	4/28/97	8081
PCB (AR1254)	0.52	mg/kg(wet)	0.1	0.1	CarmichaelJ	4/28/97	8081
PCB (AR1260)	nd	mg/kg(wet)	0.1	0.1	CarmichaelJ	4/28/97	8081

SAMPLE RESULTS

Page 17 of 31

CLIENT SAMPLE ID: F104

Date Collected: 4/18/97

Date Received: 4/22/97

Report Date: 5/22/97

EIS Sample No: 042086

EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Aldrin	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Chlordane(alpha)	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Chlordane(gamma)	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Dieldrin	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Endosulfan I	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Endosulfan II	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Endosulfan sulfate	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Endrin	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Endrin aldehyde	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Endrin ketone	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Heptachlor	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Hexachlorocyclohexane (alpha-BHC)	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Hexachlorocyclohexane (beta-BHC)	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Hexachlorocyclohexane (delta-BHC)	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Hexachlorocyclohexane (gamma-BHC)	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Methoxychlor	nd	mg/kg(wet)	0.25	0.005	CarmichaelJ	4/26/97	8081
P,P'-DDD	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
P,P'-DDE	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
P,P'-DDT	nd	mg/kg(wet)	0.05	0.005	CarmichaelJ	4/26/97	8081
Toxaphene	nd	mg/kg(wet)	2.5	0.2	CarmichaelJ	4/26/97	8081

SAMPLE RESULTS

Page 18 of 31

CLIENT SAMPLE ID: F105

Date Collected: 4/18/97

Date Received: 4/22/97

Report Date: 5/22/97

EIS Sample No: 042087

EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Arsenic, Total	166	mg/kg(wet)	5	5	ClearN	5/1/97	6010
Barium, Total	116	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Cadmium, Total	<1.0	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Chromium, Total	12.6	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Lead, Total	56.2	mg/kg(wet)	5	5	ClearN	4/28/97	6010
Mercury, Total	<0.12	mg/kg(wet)	0.12	0.2	ShaneD	4/30/97	7471
Selenium, Total	<5.0	mg/kg(wet)	5	5	ClearN	5/1/97	6010
Silver, Total	<2.0	mg/kg(wet)	1	1	ClearN	4/28/97	6010

SAMPLE RESULTS

Page 19 of 31

CLIENT SAMPLE ID: F105
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042087
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Acenaphthene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Acenaphthylene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Anthracene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(a)anthracene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(a)pyrene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(b)fluoranthene	0.63	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(ghi)perylene	0.52	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(k)fluoranthene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Chrysene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Dibenzo(a,h)anthracene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Fluoranthene	0.62	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Fluorene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Indeno(1,2,3-cd)pyrene	0.50	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Naphthalene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Phenanthrene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Pyrene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B

SAMPLE RESULTS

Page 20 of 31

CLIENT SAMPLE ID: F105

Date Collected: 4/18/97

Date Received: 4/22/97

Report Date: 5/22/97

EIS Sample No: 042087

EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
PCB (AR1016)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1221)	nd	mg/kg(wet)	0.2	0.2	KlepperW	4/25/97	8081
PCB (AR1232)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1242)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1248)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1254)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1260)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081

SAMPLE RESULTS

Page 21 of 31

CLIENT SAMPLE ID: F106
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042088
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Arsenic, Total	160	mg/kg(wet)	5	5	ClearN	5/1/97	6010
Barium, Total	133	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Cadmium, Total	<1.0	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Chromium, Total	12.1	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Lead, Total	28.3	mg/kg(wet)	5	5	ClearN	4/28/97	6010
Mercury, Total	<0.13	mg/kg(wet)	0.13	0.2	ShaneD	4/30/97	7471
Selenium, Total	<5.0	mg/kg(wet)	5	5	ClearN	5/1/97	6010
Silver, Total	<2.0	mg/kg(wet)	1	1	ClearN	4/28/97	6010

SAMPLE RESULTS

Page 22 of 31

CLIENT SAMPLE ID: F106
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042088
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Acenaphthene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Acenaphthylene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Anthracene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(a)anthracene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(a)pyrene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(b)fluoranthene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(ghi)perylene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(k)fluoranthene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Chrysene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Dibenzo(a,h)anthracene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Fluoranthene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Fluorene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Indeno(1,2,3-cd)pyrene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Naphthalene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Phenanthrene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Pyrene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B

SAMPLE RESULTS

Page 23 of 31

CLIENT SAMPLE ID: F106
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042088
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
PCB (AR1016)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1221)	nd	mg/kg(wet)	0.2	0.2	KlepperW	4/25/97	8081
PCB (AR1232)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1242)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1248)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1254)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1260)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081

SAMPLE RESULTS

Page 24 of 31

CLIENT SAMPLE ID: F107
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042089
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Arsenic, Total	144	mg/kg(wet)	5	5	ClearN	5/1/97	6010
Barium, Total	137	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Cadmium, Total	<1.0	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Chromium, Total	10.4	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Lead, Total	28.2	mg/kg(wet)	5	5	ClearN	4/28/97	6010
Mercury, Total	<0.13	mg/kg(wet)	0.13	0.2	ShaneD	4/30/97	7471
Selenium, Total	<5.0	mg/kg(wet)	5	5	ClearN	5/1/97	6010
Silver, Total	<2.0	mg/kg(wet)	1	1	ClearN	4/28/97	6010

SAMPLE RESULTS

Page 25 of 31

CLIENT SAMPLE ID: F107
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042089
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Acenaphthene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Acenaphthylene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Anthracene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(a)anthracene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(a)pyrene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(b)fluoranthene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(ghi)perylene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Benzo(k)fluoranthene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Chrysene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Dibenzo(a,h)anthracene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Fluoranthene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Fluorene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Indeno(1,2,3-cd)pyrene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Naphthalene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Phenanthrene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B
Pyrene	nd	mg/kg(wet)	0.5	0.5	DavisW	4/24/97	8270 B

SAMPLE RESULTS

Page 26 of 31

CLIENT SAMPLE ID: F107
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042089
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
PCB (AR1016)	nd	mg/kg(wet)	0.1	0.1	CarmichaelJ	4/26/97	8081
PCB (AR1221)	nd	mg/kg(wet)	0.2	0.2	CarmichaelJ	4/26/97	8081
PCB (AR1232)	nd	mg/kg(wet)	0.1	0.1	CarmichaelJ	4/26/97	8081
PCB (AR1242)	nd	mg/kg(wet)	0.1	0.1	CarmichaelJ	4/26/97	8081
PCB (AR1248)	nd	mg/kg(wet)	0.1	0.1	CarmichaelJ	4/26/97	8081
PCB (AR1254)	nd	mg/kg(wet)	0.1	0.1	CarmichaelJ	4/26/97	8081
PCB (AR1260)	nd	mg/kg(wet)	0.1	0.1	CarmichaelJ	4/26/97	8081

SAMPLE RESULTS

Page 27 of 31

CLIENT SAMPLE ID: F107

Date Collected: 4/18/97

Date Received: 4/22/97

Report Date: 5/22/97

EIS Sample No: 042089

EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Aldrin	nd	mg/kg(wet)	0.005	0.005	CarmichaelJ	4/26/97	8081
Chlordane(alpha)	nd	mg/kg(wet)	0.005	0.005	CarmichaelJ	4/26/97	8081
Chlordane(gamma)	nd	mg/kg(wet)	0.005	0.005	CarmichaelJ	4/26/97	8081
Dieldrin	nd	mg/kg(wet)	0.005	0.005	CarmichaelJ	4/26/97	8081
Endosulfan I	nd	mg/kg(wet)	0.005	0.005	CarmichaelJ	4/26/97	8081
Endosulfan II	nd	mg/kg(wet)	0.005	0.005	CarmichaelJ	4/26/97	8081
Endosulfan sulfate	nd	mg/kg(wet)	0.005	0.005	CarmichaelJ	4/26/97	8081
Endrin	nd	mg/kg(wet)	0.005	0.005	CarmichaelJ	4/26/97	8081
Endrin aldehyde	nd	mg/kg(wet)	0.005	0.005	CarmichaelJ	4/26/97	8081
Endrin ketone	nd	mg/kg(wet)	0.005	0.005	CarmichaelJ	4/26/97	8081
Heptachlor	nd	mg/kg(wet)	0.005	0.005	CarmichaelJ	4/26/97	8081
Hexachlorocyclohexane (alpha-BHC)	nd	mg/kg(wet)	0.005	0.005	CarmichaelJ	4/26/97	8081
Hexachlorocyclohexane (beta-BHC)	nd	mg/kg(wet)	0.005	0.005	CarmichaelJ	4/26/97	8081
Hexachlorocyclohexane (delta-BHC)	nd	mg/kg(wet)	0.005	0.005	CarmichaelJ	4/26/97	8081
Hexachlorocyclohexane (gamma-BHC)	nd	mg/kg(wet)	0.005	0.005	CarmichaelJ	4/26/97	8081
Methoxychlor	nd	mg/kg(wet)	0.02	0.005	CarmichaelJ	4/26/97	8081
P,P'-DDD	nd	mg/kg(wet)	0.005	0.005	CarmichaelJ	4/26/97	8081
P,P'-DDE	nd	mg/kg(wet)	0.005	0.005	CarmichaelJ	4/26/97	8081
P,P'-DDT	nd	mg/kg(wet)	0.005	0.005	CarmichaelJ	4/26/97	8081
Toxaphene	nd	mg/kg(wet)	0.2	0.2	CarmichaelJ	4/26/97	8081

SAMPLE RESULTS

Page 28 of 31

CLIENT SAMPLE ID: F108
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042090
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Arsenic, Total	199	mg/kg(wet)	5	5	ClearN	5/1/97	6010
Barium, Total	138	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Cadmium, Total	<1.0	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Chromium, Total	14.9	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Lead, Total	45.7	mg/kg(wet)	5	5	ClearN	4/28/97	6010
Mercury, Total	0.12 ^J	mg/kg(wet)	0.11	0.2	ShaneD	4/30/97	7471
Selenium, Total	<5.0	mg/kg(wet)	5	5	ClearN	5/1/97	6010
Silver, Total	<2.0	mg/kg(wet)	1	1	ClearN	4/28/97	6010

SAMPLE RESULTS

Page 29 of 31

CLIENT SAMPLE ID: F108
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042090
EIS Order No: 970:00209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
PCB (AR1016)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1221)	nd	mg/kg(wet)	0.2	0.2	KlepperW	4/25/97	8081
PCB (AR1232)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1242)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1248)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1254)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1260)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081

SAMPLE RESULTS

Page 30 of 31

CLIENT SAMPLE ID: F109

Date Collected: 4/18/97

Date Received: 4/22/97

Report Date: 5/22/97

EIS Sample No: 042091

EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
Arsenic, Total	160	mg/kg(wet)	5	5	ClearN	5/1/97	6010
Barium, Total	163	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Cadmium, Total	<1.0	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Chromium, Total	13.9	mg/kg(wet)	1	1	ClearN	4/28/97	6010
Lead, Total	50.2	mg/kg(wet)	5	5	ClearN	4/28/97	6010
Mercury, Total	0.11J	mg/kg(wet)	0.11	0.2	ShaneD	4/30/97	7471
Selenium, Total	<5.0	mg/kg(wet)	5	5	ClearN	5/1/97	6010
Silver, Total	<2.0	mg/kg(wet)	1	1	ClearN	4/28/97	6010

SAMPLE RESULTS

Page 31 of 31

CLIENT SAMPLE ID: F109
Date Collected: 4/18/97
Date Received: 4/22/97

Report Date: 5/22/97
EIS Sample No: 042091
EIS Order No: 970400209

Parameter	Results	Units	SDL	MDL	Analyst	Test Date	Method
PCB (AR1016)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1221)	nd	mg/kg(wet)	0.2	0.2	KlepperW	4/25/97	8081
PCB (AR1232)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1242)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1248)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1254)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081
PCB (AR1260)	nd	mg/kg(wet)	0.1	0.1	KlepperW	4/25/97	8081

TLI Project: 41521r1
Client Sample: F302

Method 8290 PCDD/PCDF Analysis (b)
Analysis File: T973246

Client Project:	Dioxin /Furans	Date Received:	04/23/97	Spike File:	SPX2372S
Sample Matrix:	SEDIMENT	Date Extracted:	05/06/97	ICal:	TF53286
TLI ID:	165-74	Date Analyzed:	05/10/97	ConCal:	T973236
Sample Size:	20.300	Dilution Factor:	n/a	% Moisture:	50.5
Dry Weight:	10.049 g	Blank File:	T973240	% Lipid:	n/a
GC Column:	DB-5	Analyst:	BB	% Solids:	49.5

Analyte	Conc (ppb)	Ratio	Ratio	Flags
2,3,7,8-TCDD	26.1	0.80	21:39	—
1,2,3,7,8-PeCDD	32.9	1.51	26:09	—
1,2,3,4,7,8-HxCDD	59.7	1.24	29:22	—
1,2,3,6,7,8-HxCDD	497	1.23	29:26	—
1,2,3,7,8,9-HxCDD	157	1.19	29:44	—
2,3,7,8-TCDF	176	0.81	20:53	—
1,2,3,7,8-PeCDF	27.9	1.68	25:03	PR
2,3,4,7,8-PeCDF	63.0	1.54	25:48	—
1,2,3,4,7,8-HxCDF	EMPC			E
1,2,3,6,7,8-HxCDF	86.3	1.28	28:44	—
2,3,4,6,7,8-HxCDF	178	1.23	29:12	—
1,2,3,7,8,9-HxCDF	7.1	1.24	29:57	—

Totals	Conc (ppb)	Ratio	Ratio	Flags
Total TCDD	1820	8	1900	—
Total PeCDD	305	7	1500	—
Total HxCDD	3140	8	4380	—
Total TCDF	1630	16	1640	—
Total PeCDF	2210	14	2440	—
Total HxCDF	6320	8	6870	—

Internal Standard	Conc (ppb)	Ratio	Ratio	Flags
¹³ C ₁₂ -2,3,7,8-TCDF	149	75.0	40%-130%	0.75 20:50
¹³ C ₁₂ -2,3,7,8-TCDD	141	70.9	40%-130%	0.82 21:37
¹³ C ₁₂ -1,2,3,7,8-PeCDF	129	64.6	40%-130%	1.42 25:02
¹³ C ₁₂ -1,2,3,7,8-PeCDD	132	66.4	40%-130%	1.48 26:09
¹³ C ₁₂ -1,2,3,6,7,8-HxCDF	165	82.9	40%-130%	0.51 28:43
¹³ C ₁₂ -1,2,3,6,7,8-HxCDD	178	89.6	40%-130%	1.20 29:26

TLI Project: 41521r1
Client Sample: F302

Method 8290 PCDD/PCDF Analysis (b)
Analysis File: T973246

Surrogate Standards (Type B)	Conc. (ppt)	% Recovery	QC Limits	Ratio	RT	Flags
³⁷ CL-2,3,7,8-TCDD	16.5	83.0	40%-130%		21:39	—
¹³ C ₁₂ -2,3,4,7,8-PeCDF	141	71.0	40%-130%	1.51	25:47	—
¹³ C ₁₂ -1,2,3,4,7,8-HxCDF	181	90.8	40%-130%	0.48	28:37	—
¹³ C ₁₂ -1,2,3,4,7,8-HxCDD	178	89.3	40%-130%	1.21	29:21	—

Alternate Standards (Type B)	Conc. (ppt)	% Recovery	QC Limits	Ratio	RT	Flags
¹³ C ₁₂ -1,2,3,7,8,9-HxCDF	177	89.0	40%-130%	0.51	29:56	—
¹³ C ₁₂ -2,3,4,6,7,8-HxCDF	169	84.8	40%-130%	0.50	29:13	—

Recovery Standards	Conc. (ppt)	% Recovery	QC Limits	Ratio	RT	Flags
¹³ C ₁₂ -1,2,3,4-TCDD				0.81	21:26	—
¹³ C ₁₂ -1,2,3,7,8,9-HxCDD				1.24	29:43	—

Data Reviewer: Jim 05/13/97

Page 2 of 2

X237_PSR v2.00, LARS 6.09 01

Triangle Laboratories, Inc.
801 Capitola Drive • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

Printed: 18:50 05/13/97

15

C-50

TLI Project: 41521r1
Client Sample: F305

Method 8290 PCDD/PCDF Analysis (b)
Analysis File: T973247

Client Project:	Dioxins/Furans	Date Received:	04/23/97	Spike File:	SPX2372S
Sample Matrix:	SEDIMENT	Date Extracted:	05/06/97	ICal:	TF53286
TLI ID:	165-74-3	Date Analyzed:	05/10/97	ConCal:	T973236
Sample Size:	15.830 g	Dilution Factor:	n/a	% Moisture:	36.9
Dry Weight:	9.989 g	Blank File:	T973240	% Lipid:	n/a
GC Column:	DB-5	Analyst:	BB	% Solids:	63.1

Analyte	Conc (ppt)	Number of Dioxins	EMPC	Ratio	Ratio	Ratio
2,3,7,8-TCDD	2.5			0.71	21:40	—
1,2,3,7,8-PeCDD	EMPC		4.3			—
1,2,3,4,7,8-HxCDD	9.3			1.23	29:23	—
1,2,3,6,7,8-HxCDD	43.7			1.26	29:28	—
1,2,3,7,8,9-HxCDD	19.3			1.22	29:45	—
1,2,3,4,6,7,8-HpCDD	1350			1.05	32:16	—
1,2,3,4,6,7,8,9-OCDD	11590			0.83	34:44	—
2,3,7,8-TCDF	12.4			0.84	20:53	—
1,2,3,7,8-PeCDF	3.0			1.52	25:04	PR
2,3,4,7,8-PeCDF	5.5			1.53	25:49	—
1,2,3,4,7,8-HxCDF	EMPC		41.0			E
1,2,3,6,7,8-HxCDF	11.8			1.24	28:45	—
2,3,4,6,7,8-HxCDF	14.0			1.30	29:15	PR
1,2,3,7,8,9-HxCDF	0.96			1.05	29:58	PR
1,2,3,4,6,7,8-HpCDF	609			1.05	31:25	—
1,2,3,4,7,8,9-HpCDF	45.3			1.09	32:36	—
1,2,3,4,6,7,8,9-OCDF	5190			0.90	34:51	—

Totals	Conc (ppt)	Number of Dioxins	EMPC	Ratio	Ratio	Ratio
Total TCDD	73.5	9	84.4			—
Total PeCDD	45.8	5	160			—
Total HxCDD	289	7	436			—
Total HpCDD	2490	2				—
Total TCDF	129	15	132			—
Total PeCDF	219	10	266			E
Total HxCDF	582	8	631			—
Total HpCDF	2720	3				—

TLI Project: 41521r1
Client Sample: F305

Method 8290 PCDD/PCDF Analysis (b)
Analysis File: T973247

Internal Standards	Conc. (ppt)	% Recovery	QC Limits	Ratio	RT	Flags
¹³ C ₁₂ -2,3,7,8-TCDF	117	58.2	40%-130%	0.76	20:52	—
¹³ C ₁₂ -2,3,7,8-TCDD	101	50.6	40%-130%	0.83	21:39	—
¹³ C ₁₂ -1,2,3,7,8-PeCDF	95.8	47.9	40%-130%	1.50	25:04	—
¹³ C ₁₂ -1,2,3,7,8-PeCDD	99.4	49.7	40%-130%	1.48	26:10	—
¹³ C ₁₂ -1,2,3,6,7,8-HxCDF	128	63.9	40%-130%	0.52	28:44	—
¹³ C ₁₂ -1,2,3,6,7,8-HxCDD	140	69.9	40%-130%	1.21	29:27	—
¹³ C ₁₂ -1,2,3,4,6,7,8-HpCDF	132	66.0	25%-130%	0.44	31:24	—
¹³ C ₁₂ -1,2,3,4,6,7,8-HpCDD	125	62.3	25%-130%	1.00	32:15	—
¹³ C ₁₂ -1,2,3,4,6,7,8,9-OCDD	233	58.1	25%-130%	0.87	34:44	—

Surrogate Standards	Conc. (ppt)	% Recovery	QC Limits	Ratio	RT	Flags
³⁷ Cl ₄ -2,3,7,8-TCDD	10.4	52.2	40%-130%		21:40	—
¹³ C ₁₂ -2,3,4,7,8-PeCDF	99.4	49.7	40%-130%	1.49	25:49	—
¹³ C ₁₂ -1,2,3,4,7,8-HxCDF	130	65.0	40%-130%	0.50	28:39	—
¹³ C ₁₂ -1,2,3,4,7,8-HxCDD	138	68.9	40%-130%	1.22	29:22	—
¹³ C ₁₂ -1,2,3,4,7,8,9-HpCDF	140	69.7	25%-130%	0.43	32:36	—

Alternate Standards	Conc. (ppt)	% Recovery	QC Limits	Ratio	RT	Flags
¹³ C ₁₂ -1,2,3,7,8,9-HxCDF	144	72.1	40%-130%	0.52	29:57	—
¹³ C ₁₂ -2,3,4,6,7,8-HxCDF	130	65.1	40%-130%	0.51	29:15	—

Recovery Standards	Ratio	RT	Flags
¹³ C ₁₂ -1,2,3,4-TCDD	0.81	21:27	—
¹³ C ₁₂ -1,2,3,7,8,9-HxCDD	1.24	29:45	—

Data Reviewer:  05/13/97

TLI Project: 41521
Client Sample: F307

Method 8290 PCDD/PCDF Analysis (b)
Analysis File: S973015

Client Project:	Dioxins/Furans	Date Received:	04/23/97	Spike File:	SPX2372S
Sample Matrix:	SEDIMENT	Date Extracted:	04/27/97	ICal:	SF52067
TLI ID:	165-74-4	Date Analyzed:	05/05/97	ConCal:	S973006
Sample Size:	14.430 g	Dilution Factor:	n/a	% Moisture:	30.8
Dry Weight:	9.986 g	Blank File:	S972991	% Lipid:	n/a
GC Column:	DB-5	Analyst:	ADP	% Solids:	69.2

Analyte	Conc (ppb)	DE	EMPC	RMG	RT	Flags
2,3,7,8-TCDD	ND	0.6				—
1,2,3,7,8-PeCDD	ND	0.8				—
1,2,3,4,7,8-HxCDD	ND	1.4				—
1,2,3,6,7,8-HxCDD	EMPC		3.3			—
1,2,3,7,8,9-HxCDD	3.0			1.26	28:02	—
1,2,3,4,6,7,8-HpCDD	53.0			0.99	30:38	—
1,2,3,4,6,7,8,9-OCDD	599			0.81	33:03	—
2,3,7,8-TCDF	3.4			0.80	17:56	—
1,2,3,7,8-PeCDF	ND	0.6				—
2,3,4,7,8-PeCDF	EMPC		1.2			—
1,2,3,4,7,8-HxCDF	EMPC		4.5			E_
1,2,3,6,7,8-HxCDF	1.2			1.20	26:58	—
2,3,4,6,7,8-HxCDF	1.4			1.09	27:29	—
1,2,3,7,8,9-HxCDF	ND	1.0				—
1,2,3,4,6,7,8-HpCDF	21.2			0.96	29:46	—
1,2,3,4,7,8,9-HpCDF	ND	1.3				—
1,2,3,4,6,7,8,9-OCDF	49.8			0.84	33:07	—

Totals	Conc (ppb)	DE	EMPC	Flags
Total TCDD	17.1	5	25.0	—
Total PeCDD	21.8	5	28.9	—
Total HxCDD	19.2	3	36.9	—
Total HpCDD	105	2		—
Total TCDF	18.7	9	25.4	E_
Total PeCDF	8.8	2	31.8	E_
Total HxCDF	18.4	4	25.6	E_
Total HpCDF	55.7	2		—

LI Project: 41521
Client Sample: F307

Method 8290 PCDD/PCDF Analysis (b)
Analysis File: S973015

Internal Standards	Conc. (ppt)	% Recovery	QC Limits	Ratio	RT	Flags
¹² C ₁₂ -2,3,7,8-TCDF	84.9	42.4	40%-130%	0.75	17:56	—
¹² C ₁₂ -2,3,7,8-TCDD	77.5	38.7	40%-130%	0.83	18:54	V
¹² C ₁₂ -1,2,3,7,8-PeCDF	79.2	39.5	40%-130%	1.45	22:54	V
¹² C ₁₂ -1,2,3,7,8-PeCDD	98.4	49.2	40%-130%	1.46	24:11	—
¹² C ₁₂ -1,2,3,6,7,8-HxCDF	78.3	39.1	40%-130%	0.48	26:57	V
¹² C ₁₂ -1,2,3,6,7,8-HxCDD	85.9	42.9	40%-130%	1.22	27:43	—
¹² C ₁₂ -1,2,3,4,6,7,8-HpCDF	80.3	40.1	25%-130%	0.42	29:45	—
¹² C ₁₂ -1,2,3,4,6,7,8-HpCDD	102	51.1	25%-130%	0.97	30:38	—
¹² C ₁₂ -1,2,3,4,6,7,8,9-OCDD	214	53.5	25%-130%	0.82	33:02	—

Surrogate Standards (Type B)	Conc. (ppt)	% Recovery	QC Limits	Ratio	RT	Flags
¹⁷ Cl ₄ -2,3,7,8-TCDD	6.9	34.6	40%-130%	—	18:55	V
¹³ C ₁₂ -2,3,4,7,8-PeCDF	84.8	42.4	40%-130%	1.43	23:45	—
¹³ C ₁₂ -1,2,3,4,7,8-HxCDF	85.8	42.8	40%-130%	0.49	26:50	—
¹³ C ₁₂ -1,2,3,4,7,8-HxCDD	85.8	42.9	40%-130%	1.20	27:38	—
¹³ C ₁₂ -1,2,3,4,7,8,9-HpCDF	89.2	44.5	25%-130%	0.39	30:58	—

Alternate Standards (Type B)	Conc. (ppt)	% Recovery	QC Limits	Ratio	RT	Flags
¹³ C ₁₂ -1,2,3,7,8,9-HxCDF	89.4	44.6	40%-130%	0.48	28:12	—
¹³ C ₁₂ -2,3,4,6,7,8-HxCDF	83.7	41.8	40%-130%	0.49	27:29	—

Recovery Standards	Conc. (ppt)	% Recovery	QC Limits	Ratio	RT	Flags
¹³ C ₁₂ -1,2,3,4-TCDD	—	—	—	0.84	18:38	—
¹³ C ₁₂ -1,2,3,7,8,9-HxCDD	—	—	—	1.21	28:01	—

Data Reviewer: S.A. 05/09/97



ecology and environment, inc.

International Specialists in the Environment

33 North Dearborn Street
Chicago, Illinois 60602
Tel. 312/578-9243, Fax: 312/578-9345

M E M O R A N D U M

DATE: June 23, 1997

TO: Damon Sinars, START Project Manager, E & E, Chicago, Illinois

FROM: David Hendren, START Analytical Services Manager, E & E, Chicago, Illinois

THROUGH: Mary Jane Ripp, Assistant START Program Manager, E & E, Chicago, Illinois

SUBJECT: Data Quality Review for Polychlorinated Dibenzo-dioxin/Polychlorinated Dibenzofuran (PCDD/PCDF), Sauget Area One, Sauget, St. Clair County, Illinois

REFERENCE: Project TDD S05-9703-012 Analytical TDD S05-9704-806
Project PAN 7M1201SIXX Analytical PAN 7AAF01TAXX

The data quality assurance (QA) review of four sediment samples collected from the Sauget Area One site is complete. The samples were collected on April 18, 1997, by the Superfund Technical Assessment and Response Team (START) contractor, Ecology and Environment, Inc. (E & E). The samples were submitted to EIS Analytical Services, Inc., South Bend, Indiana. The laboratory analyses were performed according to the United States Environmental Protection Agency (U.S. EPA) Solid Waste 846 Method 8290.

Sample Identification

<u>START</u> <u>Identification No.</u>	<u>Laboratory</u> <u>Identification No.</u>
F301	42092
F302	42093
F305	42094
F307	42095

Sauget Area One
Project TDD S05-9703-012
Analytical TDD S05-9704-804
PCDD/PCDF
Page 2

Data Qualifications:

I. Sample Holding Time: Acceptable

The samples were collected on April 18, 1997, extracted on April 27, 1997, and analyzed on May 5, 1997. This is within the six-month holding time limit, from collection to extraction and 40-day limit from extraction to analysis.

II. Gas Chromatography/Mass Spectrometry (GC/MS) Performance: Acceptable

Acceptable chromatographic resolution was demonstrated through the separation of 2,3,7,8-tetrachlorodibenzodioxin (TCDD) and 2,3,7,8-tetrachlorodibenzofuran (TCDF) isomers. The resolution of the mass spectrometer was verified before analysis.

III. Calibrations:

• Initial Calibration: Acceptable

A five-point initial calibration was performed prior to analysis. The percent relative standard deviations (%RSDs) between response factors were less than 20% for TCDD/TCDF.

• Continuing Calibration: Acceptable

The percent differences of the response factors were less than 15%, as required, for TCDD/TCDF.

IV. Blank: Acceptable

A method blank was analyzed with the samples. No target compounds or contaminants were detected in the blank.

V. Compound Identification: Acceptable

Identification of PCDD/PCDF present in the samples was based on numerous criteria, as specified in the method.

VI. Additional QC Checks: Acceptable

The recoveries of the internal standards added to each sample were within acceptable limits.

Sauget Area One
Project TDD S05-9703-012
Analytical TDD S05-9704-804
PCDD/PCDF
Page 3

VII. Overall Assessment of Data for Use: Acceptable

The overall usefulness of the data is based on criteria for QA Level II as outlined in the Office of Solid Waste and Emergency Response (OSWER) Directive 9360.4-01 (April 1990), Data Validation Procedures, Section 8.0, 2,3,7,8-TCDD. Based upon the information provided, the data are acceptable for use.

LI Project: 41521
Client Sample: F301

Method 8290 PCDD/PCF
Analysis File.

Client Project:	Dioxins/Furans	Date Received:	04/23/97	Spike File:	SPX2372S
Sample Matrix:	SEDIMENT	Date Extracted:	04/27/97	ICal:	SF52067
TLI ID:	165-74-1	Date Analyzed:	05/05/97	ConCal:	S973006
Sample Size:	16.240 g	Dilution Factor:	n/a	% Moisture:	38.4
Dry Weight:	10.004 g	Blank File:	S972991	% Lipid:	n/a
GC Column:	DB-5	Analyst:	ADP	% Solids:	61.6

Analysis	Conc (ppb)	Number of Data Points	EMPC	Retention Time (min)	Flags
2,3,7,8-TCDD	ND	0.7			
1,2,3,7,8-PeCDD	EMPC	1.4			
1,2,3,4,7,8-HxCDD	4.1			1.07	27:38
1,2,3,6,7,8-HxCDD	8.3			1.25	27:44
1,2,3,7,8,9-HxCDD	7.9			1.11	28:01
1,2,3,4,6,7,8-HpCDD	213			1.14	30:38
1,2,3,4,6,7,8,9-OCDD	3250			0.80	33:02
2,3,7,8-TCDF	3.5			0.69	17:56
1,2,3,7,8-PeCDF	0.66			1.51	22:54
2,3,4,7,8-PeCDF	1.1			1.40	23:46
1,2,3,4,7,8-HxCDF	EMPC	9.2			E
1,2,3,6,7,8-HxCDF	1.8			1.26	26:57
2,3,4,6,7,8-HxCDF	1.8			1.07	27:29
1,2,3,7,8,9-HxCDF	ND	1.2			PR
1,2,3,4,6,7,8-HpCDF	210			0.90	29:45
1,2,3,4,7,8,9-HpCDF	12.5			0.91	30:58
1,2,3,4,6,7,8,9-OCDF	603			0.82	33:07

Totals	Conc (ppb)	Number of Data Points	EMPC	Flags
Total TCDD	58.5	8	62.8	
Total PeCDD	45.9	5	72.1	
Total HxCDD	92.6	6	113	
Total HpCDD	446	2		
Total TCDF	33.0	11	37.7	E
Total PeCDF	24.3	6	39.2	E
Total HxCDF	82.7	6	96.3	E
Total HpCDF	558	3		

ETS Environmental & Engineering

GLI Project: 41521
Client Sample: F301

Method 8290 PCDD/PCDF Analysis (b)
Analysis File: S973012

Internal Standard	Conc. (ppt)	% Recovery	QC Limit	Ratio	RT	Flags
¹² C ₁₂ -2,3,7,8-TCDF	155	77.1	40%-130%	0.76	17:55	—
¹³ C ₁₂ -2,3,7,8-TCDD	50	74.8	40%-130%	0.73	18:53	—
¹³ C ₁₂ -1,2,3,7,8-PeCDF	63	81.4	40%-130%	1.46	22:54	—
¹³ C ₁₂ -1,2,3,7,8-PeCDD	30	89.9	40%-130%	1.57	24:10	—
¹³ C ₁₂ -1,2,3,6,7,8-HxCDF	37	68.3	40%-130%	0.48	26:57	—
¹³ C ₁₂ -1,2,3,6,7,8-HxCDD	33	81.4	40%-130%	1.21	27:43	—
¹³ C ₁₂ -1,2,3,4,6,7,8-HpCDF	177	88.3	25%-130%	0.39	29:45	—
¹³ C ₁₂ -1,2,3,4,6,7,8-HpCDD	136	93.1	25%-130%	1.01	30:38	—
¹³ C ₁₂ -1,2,3,4,6,7,8,9-OCDD	378	94.6	25%-130%	0.87	33:02	—

Surrogate Standard (Type B)	Conc. (ppt)	% Recov	QC Limit	Ratio	RT	Flags
³⁷ Cl-2,3,7,8-TCDD	14.6	73.0	40%-130%		18:54	—
¹³ C ₁₂ -2,3,4,7,8-PeCDF	157	78.4	40%-130%	1.48	23:45	—
¹³ C ₁₂ -1,2,3,4,7,8-HxCDF	151	75.3	40%-130%	0.48	26:49	—
¹³ C ₁₂ -1,2,3,4,7,8-HxCDD	173	86.7	40%-130%	1.20	27:38	—
¹³ C ₁₂ -1,2,3,4,7,8,9-HpCDF	177	88.6	25%-130%	0.39	30:58	—

Alternate Standard (Type B)	Conc. (ppt)	% Recov	QC Limit	Ratio	RT	Flags
¹³ C ₁₂ -1,2,3,7,8,9-HxCDF	171	85.7	40%-130%	0.48	28:12	—
¹³ C ₁₂ -2,3,4,6,7,8-HxCDF	148	74.2	40%-130%	0.48	27:28	—

Recovery Standard	Conc. (ppt)	% Recov	QC Limit	Ratio	RT	Flags
¹³ C ₁₂ -1,2,3,4-TCDD				0.75	18:38	—
¹³ C ₁₂ -1,2,3,7,8,9-HxCDD				1.24	28:00	—

Data Reviewer: 3-A 05/09/97